APPENDIX B

GEOTECHNICAL REPORT

APPENDIX B
Bal Harbor Detailed Design Report
Geotechnical Report

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REGIONAL GEOLOGY

Peninsular Florida occupies a portion of the much larger geologic unit called the Florida Plateau. Deep water in the Gulf of Mexico is separated from deep water of the Atlantic Ocean by this partially submerged platform nearly 500 miles long and 450 miles wide. In the last 200 million years, the plateau has been alternately dry land or covered by shallow seas. During that time up to 20,000 feet of carbonate and marine sediments were deposited. There has been a tilting of the Florida Plateau about its longitudinal axis. The west coast is partially submerged, as indicated by the wide estuaries and offshore channels, while the east coast is correspondingly elevated, showing the characteristics of an emergent coastline.

During the last million years, a series of four glacial periods, or ice ages, brought about significant changes in sea level. As a result of these sea level fluctuations, the Florida peninsula was again covered and uncovered by shallow seas. Following the first glacial period, sea level rose 270 feet above its present level. Dry land on the Florida peninsula was then restricted to a few small islands along the central Florida ridge and in northeast Florida.

About 100,000 years ago, the last glacial period began. Sea level fell to 300 feet below its present level and the Florida Plateau emerged as dry land. Approximately 15,000 years ago, sea level began its most recent rise towards present sea level (Shinn, 1988). Sea level rose at an average rate of 30 feet per 1,000 years. About 7,000 years ago, the rate of sea level rise slowed when sea level was about 30 feet below its present level.

It was at this most recent slowing of sea level rise that the modern barrier islands of southeast peninsular Florida formed. It is generally accepted that sea level is continuing to rise and is a major contributor to erosion at the shoreline. The primary causes of sea level rise today are the melting of the polar ice caps and thermal expansion of the ocean waters

The quartz component of the modern barrier island sand is quartz sand that has migrated southward along the Atlantic coast and the reworking of the Pamlico Sand that was previously deposited over the entire region. Approximately 40 to 80 percent of the coastal sediments are carbonates locally produced by calcite producing plants and animals. It is estimated that 20 to 60 percent of the carbonate material is reworked materials from outcropping Pleistocene formations offshore (Duane and Meisburger, 1969).

The present coral reefs in south Florida began to grow 6,500 years ago.

GEOLOGY OF SOUTHEAST FLORIDA

The surficial geologic deposits of southeast Florida are the Miami, Key Largo, Anastasia, and Fort Thompson Formations. These limestone formations were deposited in shallow Pleistocene seas.

The Fort Thompson Formation is the oldest formation and was deposited in warm shallow seas similar in environment to the broad barren marine plains covering the Bahamas Banks today.

Later, coral reefs of the Key Largo Limestone created a shelter behind which the bryozoan facies of the Miami Limestone formed. Later broad shoals of oolitic sediments were deposited along the coast.

The Anastasia and the Miami Formations were formed as sand shoals and beach ridges 100,000 to 125,000 years ago. (Shinn, 1988). Tidal channels cut through the carbonate and oolitic shoals, connecting the shallow sea covering the Everglades with the Atlantic Ocean. These channels form the parallel cuts known today as the Transverse Glades in Dade County (Hoffmeister, 1974).

The landforms of the coastal area of Dade County include barrier islands, lagoons, estuaries, and coastal ridges. The Atlantic Coastal Ridge ranges from 2 to 4 miles wide and lies between the sandy flatlands of the Everglades to the west and the coastal marshes or ocean to the east. In the Miami area, the Atlantic Coastal Ridge shows the expression of the Silver Bluff shoreline of the late Wisconsin Interglacial period.

The nearshore shelf off of Dade County consists of Pleistocene rock reefs separated by sandy plateaus. The sand filled swales between the rock reefs is of a thickness and quality that it has been used as a primary borrow source from Dade to Palm Beach County.

EXISTING CONDITIONS

The initial construction and renourishment of the Dade County Beach Erosion Control and Hurricane Protection Project has utilized all large volumes of offshore sand sources from the Broward County line to Government Cut. The following is a summary of alternate sand sources for Dade County renourishment.

a. Existing Beach

Existing Miami Beach sands are locally eroded limestone and shell deposits, and silica/quartz sands, which represent the southerly littoral transport of material from a further north province. The sands, which currently characterize Miami Beach, are not “native beach sands”, but represent the product of 25 years of beach nourishment using sand dredged from offshore of Miami Beach. The sand consists mainly of carbonate grains and shell fragments, 35-40% of quartz grains are present. The quartz grains are finer and white while the carbonate and shell materials are coarser. A summary of native beach grain size and sorting is presented in Table 1. The mean grain size and sorting for Dade County native beaches is 0.33 mm and 1.04 phi sorting (USACE, 1984).

Table 1 Summary of Native Beach Grain Size and Sorting

PROJECT LOCATION	MEAN GRAIN SIZE (PHI)	MEAN GRAIN SIZE (MM)	SORTING
Sunny Isles	1.69	0.31	1.01
Haulover Beach Park	1.69	0.31	1.01
Bakers Haulover Inlet			
Miami Beach			
Native beach (1977)	1.59	0.33	1.04
Post-Project (1982)	1.46	0.36	1.81
Government Cut			
Fisher Island	1.87	0.27	0.73
Key Biscayne (1973)	1.88	0.27	0.88
(1985)	1.77	0.29	1.02
Coast of Florida Study, 1996			

b. SGC-Ext. Offshore of Govt. Cut

Borrow area SGC-EXT is southeast of the Government Cut (Figure 1 & Figure 2). The borrow area is situated in a sand filled swale between two outcroppings of Pleistocene limestone in approximately 22 to 38 foot water depth. The hardgrounds in the vicinity of Borrow area SGC-EXT were mapped using high-resolution side scan sonar for the Coast of Florida Study. The results of the remote sensing survey were ground truthed by the Corps of Engineers, DERM, and U.S. Fish and Wildlife Service biologist divers. The borrow area was designed starting from buffering the completely mapped hardground areas. Construction limits of the borrow area are a minimum of 400 feet from any mapped hardground area. The excavation elevations are a minimum of two feet above any undesirable material.

The material to be excavated is generally light gray, poorly-graded carbonate sand with a trace of silt and gravel-sized shell fragments. The silt content is shown in Table 2 below.

Table 2 Silt Content

Percent Silt		
Sieve Size	200 Sieve/0.074 mm	230 Sieve/0.063 mm
Range	0.9 – 11.4%	0.8 - 9.2%
Average	4.2%	3.7%

The composite mean grain size of the borrow area SGC-Ext is 0.66 phi (0.62 mm) with a standard deviation of 1.41 phi. This borrow material represents a high quality beach nourishment sand source with low silt content.

Carbonate rock fragments occur within the borrow area. It is estimated that up to 5 percent of the borrow area may be rock fragments from 1 inch to 3 feet in diameter. All rock fragments larger than 1 inch shall be separated from the sand and disposed of in an approved offshore rock disposal area. The separation will take place on board the dredge.

This area contains approximately 500,000 cubic yards of sand. It has been discussed that this area should be kept as an emergency source of sand, should the project need it. Borrow area SGC-Ext is fully designed and ready for contract drawings.

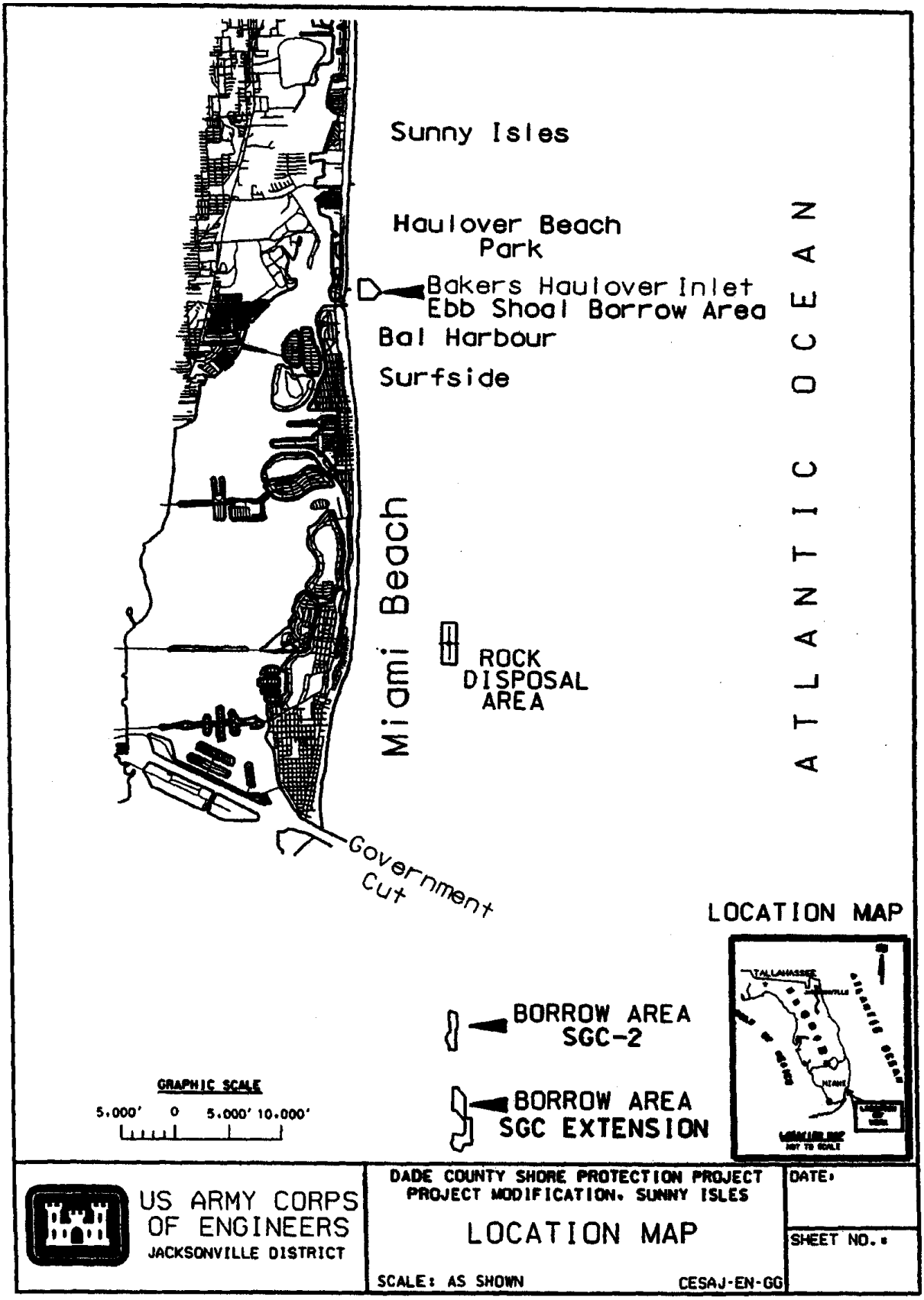

Figure 1. Location Map of Borrow Area SGC-EXT

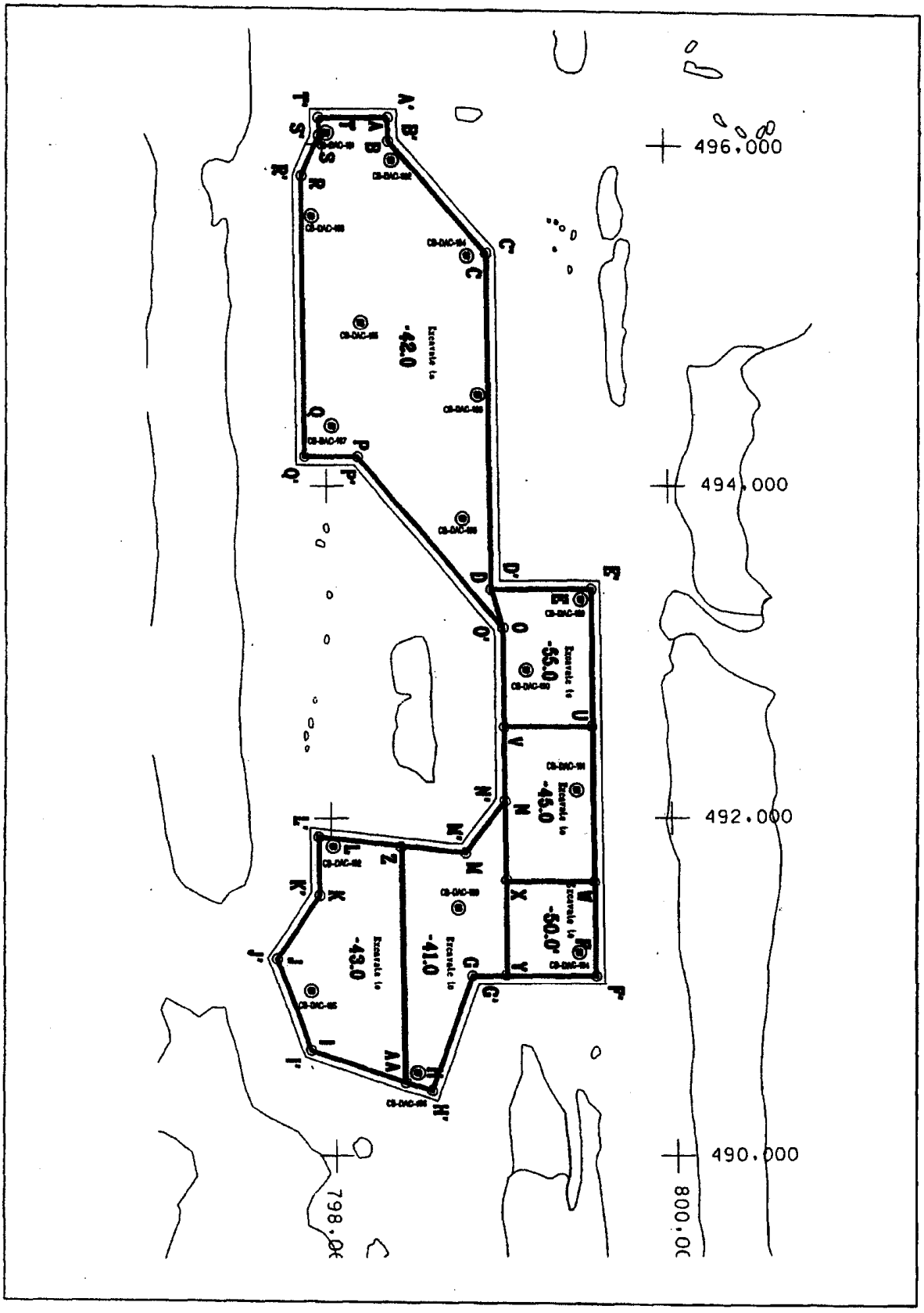

Figure 2. Borrow Area SGC-EXT

c. Material Remaining in Previously Used Dade Offshore Borrow Areas

South of Government Cut, all but one half of the southern most identified borrow area (SGC-Ext) has been used. Baker's Haulover Inlet Ebb shoal was recently used but is a renewable source. It is anticipated that some of the Dade County offshore borrow areas used for construction may have residual sand reserves that could be tapped for smaller quantities of sand. It is generally expected that approximately 100,000 to 200,000 cubic yards of sand is recoverable from many of the previously used borrow areas. In addition, there are smaller sand pockets in this size range that have never been dredged due to the smaller quantity of sand available. To verify these sand sources, new sampling plans and laboratory testing would be required. In addition, the viability of using areas offering small quantities of sand would have to be evaluated in light of current environmental restrictions and costs. These small volume borrow areas encompass higher cost for the sand and generally higher environmental risks. Maps showing geotechnical coverage summaries of Dade County borrow areas are included in the Appendix.

d. Deepwater Borrow Sites Offshore Dade County

The Coast of Florida Study performed some deep-water explorations for sand sources off the edge of the continental shelf off of Dade County. Positive results of that study prompted Dade County to pursue deep-water sand sources. The resulting report, " Deep Water Geotechnical Investigation of Offshore Sand Deposits for Beach Renourishment in Dade County, Florida", September 2000, was prepared by Coastal Planning and Engineering in association with Scientific Environmental Applications and estimates 20,000,000 cubic yards of beach compatible sand within the deep water sand sources. State requirements regarding silt content and hardbottom buffer zones issued since then may put the estimate closer to 10,000,000 cubic yards. The dredging industry has continually expressed that these are dredgable water depths, if the work were available. Equipment for dredging at these water depths is not currently available in the United States, due to no previous work being done at these water depths. It is only a modification of existing equipment to start dredging at these water depths.

The study can be broadly divided into three sub-sections according to depth and corresponding lithology. The three sub-sections typically lie in the ranges of 55-100 feet, 130-240 feet and 250-300 feet. The division between the two deep-water sections is probably a wave-cut scarp or bench that is persistently present at depths of 250 to approximately 290 feet.

The lower portion of the scarp is usually buried under fine-grained clean sand according to seismic records and reconnaissance cores.

The overall result of the Deep-Water Reconnaissance Survey demonstrated a significant potential for beach compatible sand resources in the deep water off the continental slope off Dade County. The overall potential is demonstrated by the presence of 12 to 15 feet of sediment thickness overlying the lower acoustic reflector identified in most of the seismic profiles. The most likely candidate for large volumes of beach compatible sand is in water depths in excess of 250 feet in the central portion of the survey area (Figure 3). Here the reconnaissance level survey indicates deposits of at least 15 feet thick, having low silt content.

Sediment deposits at depths of less than 170 feet are relatively thin and may be confined to a thickness of 3 to 7 feet above the first sub-bottom reflector. The lithology of this material is dominantly fine sand mixed with carbonate rock fragments. Some cores from this shallower zone can be described as semi-lithified due to the large percentage of rock fragments. Based on the seismic survey results, rock fragments and a lithified horizon present in shallower cores may represent the nature of the lower acoustic reflector present below the surface in deeper water. Sediment recovered from deeper areas beyond 250 feet and above the apparently hard second reflector, tends to be sandier and include near zero percent of coarse rock fragments.

The 22-mile long survey area was broken into Zone 1, Zone 2 and Zone 3, Zone 1 being the farthest North (Figure 3). Each zone is discussed below. Table 3 shows sediment statistics for the three zones.

Zone 1

Figure 4 shows the core boring locations in Zone 1 along the north end of the survey area. The sediment is composed of carbonate sand with silt and/or semi-lithified carbonate sand with high silt. Core borings 1 and 16 were taken in the shallower portion of this zone, whereas Core 17 was taken in deep water (296 ft). All sediment recovered from cores in Zone 1 was relatively high in silt content, which ranged from 8 to 23%. Sediments in Cores 1 and 16 contained a large percentage of rock fragments, which was typical of semi-lithified sands recovered from depths of less than 170 feet. Material contained in Core 17, a deep core, did contain a relatively large silt fraction. No estimate of volume was made for Zone 1 due to the high silt content and high concentration of rock fragments.

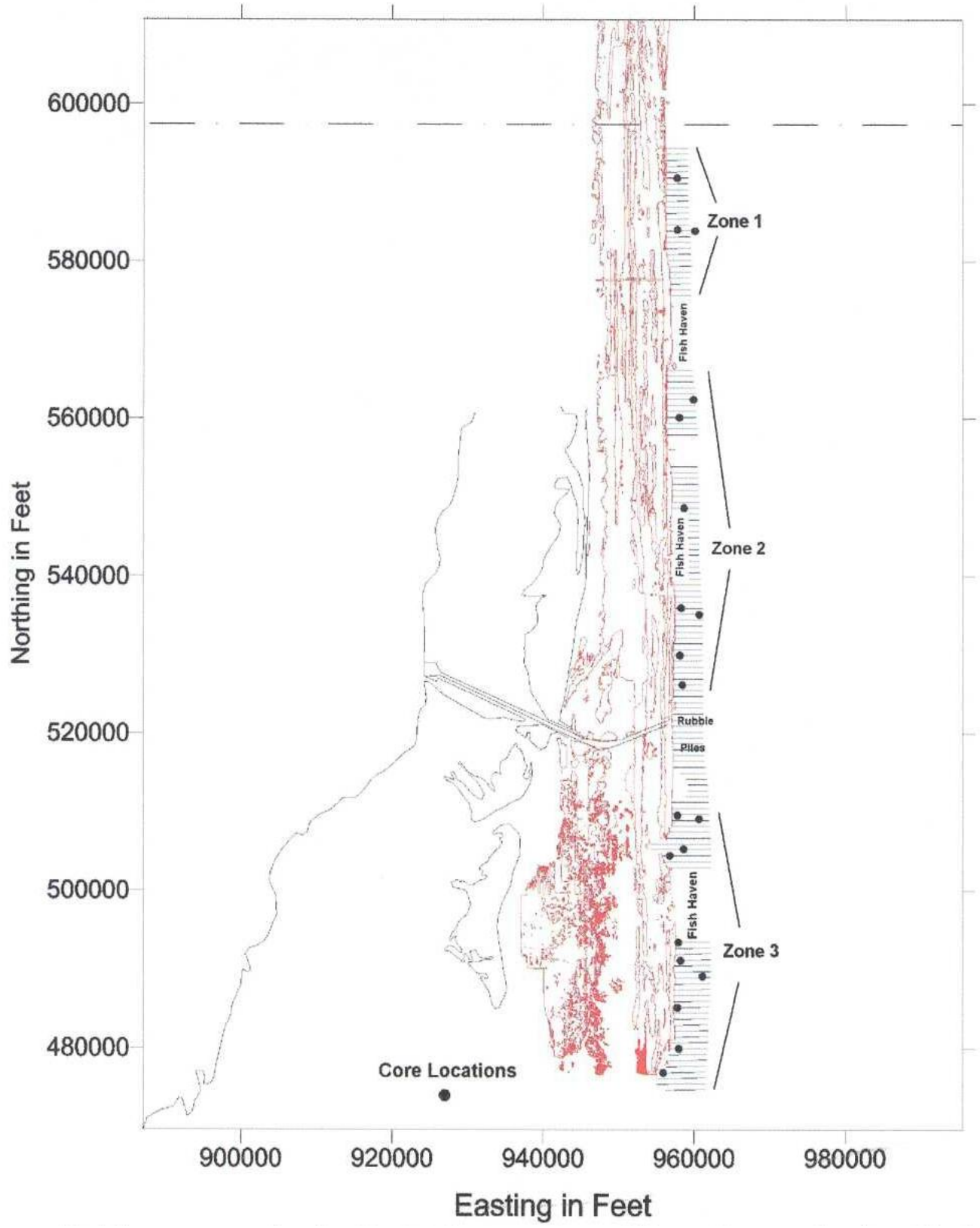

Figure 3. Deepwater Borrow Sites Offshore Dade County

Table 3. Deepwater Sites Offshore Dade County

Deepwater Sites (Total Approximate Volume 20,200,000 CY)							
	Zone 1		Zone 2		Zone 3		
	130-240′	250-300′	250-300′	250-300′	55-100′	130-240′	250-300′
Approximate Volume (1,000 CY)	No volume estimate due to high silt content		1,000	9,900	1,400	1,900	6,000
Color Range (Munsell)	10YR 8/1 - 10YR 8/3	10YR 6/2 - 10YR 7/2	10YR 8/1 - 10YR 7/3	10YR 8/1 - 10YR 8/2	10YR 8/1 - 10YR 8/2	10YR 8/1 - 10YR 7/3	10YR 8/1 - 10YR 8/2
Color Range (Description)	White - Pale Brown	Light gray - Pale Brown	White - Greenish Brown	White - Pale Brown	White - Pale Brown	White - Pale Brown - Gray	Light Gray - Pale Brown
Mean Grain Size Range (mm)	0.56 - 2.52	0.21 - 0.22	0.30 - 1.16	0.27 - 0.42	0.16 - 0.84	0.14 - 1.44	0.17 - 0.23
Silt Content Range (%)	8.1 - 17.1	21.8 - 26.6	4.5 - 12.5	6.9 - 9.6	2.9 - 15.1	4.5 - 17.1	12.8 - 23.8

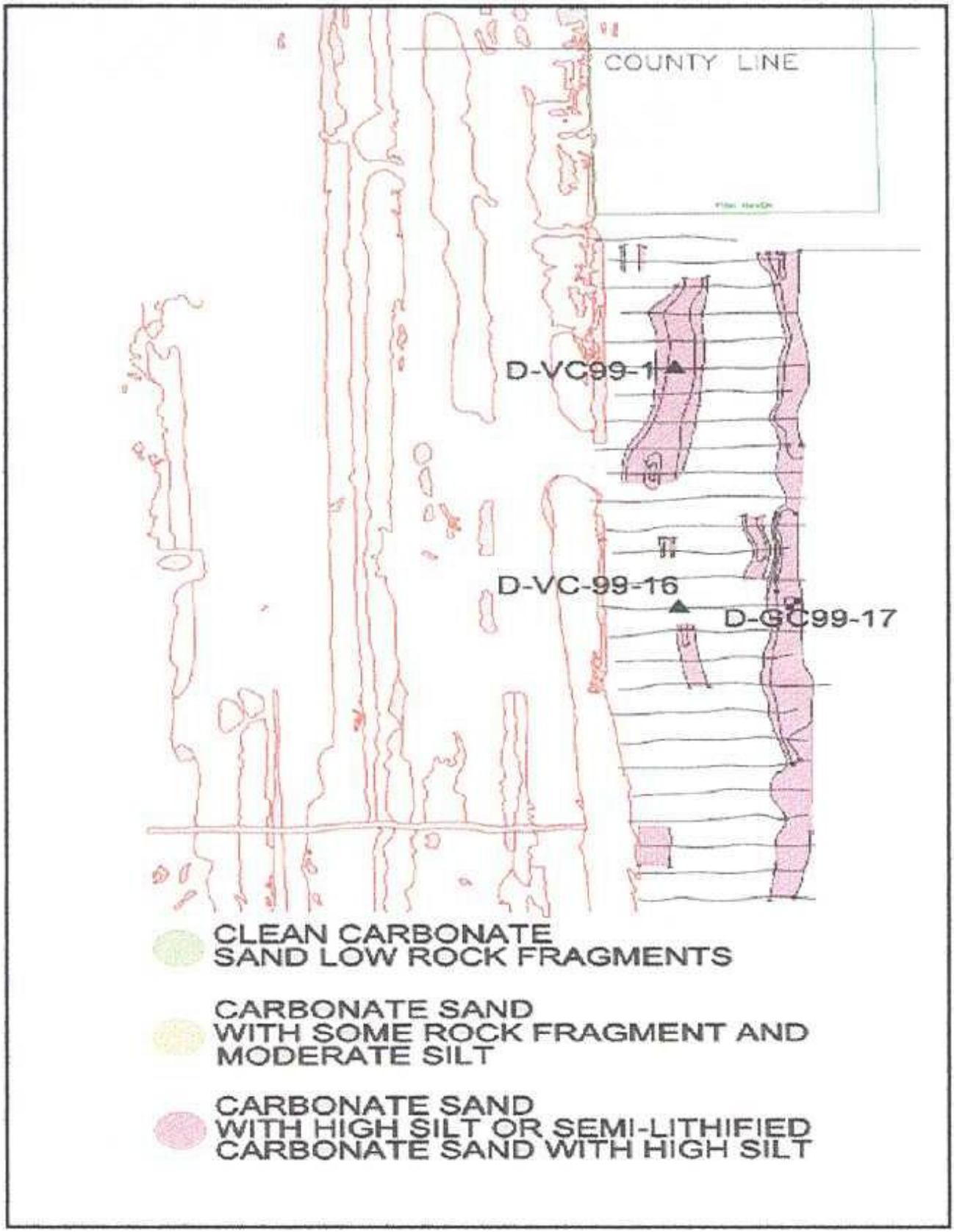

Figure 4. Zone 1 Vibracore Locations

Zone 2

The most beach compatible sediment characteristics found in the investigation was in core borings recovered from the large central zone Figure . Sediment recovered from Zone 2 had the lowest silt content. However, rock fragments and partial lithification were characteristic of sediments recovered from cores taken in shallower water where total sediment overburden is thinnest. Cores 18 and 19, taken in water depths below 270 feet, contained relatively clean carbonate sand having less than 10% in silt content. The gravel fraction of the deep cores was near zero. The sand fraction, composing approximately 90% of sediment found in these cores was in the medium to fine sand range. The textural features of cores 18 and 19 are consistent with the interpretation that sediments in this depth range are fine-grained sands of a relict shoreface.

Cores from the shallower areas of Zone 2, above 230 feet, contained slightly higher silt fractions and a much larger gravel fraction compared to deeper cores in this zone. The gravel fraction included lithified carbonate sand, fragments of coral reef, and other fragments of carbonate reef debris. Among the cores taken from shallower depths, Cores 13 and 15 at the south end of Zone 2 contained the highest percentage of silt. A volume of 9,900,000 cubic yards of unconsolidated material is estimated for the sediment between the depths of 250 to 300 feet assuming a 12-foot dredge cut depth. Between the depths of 130 and 240 feet to a 4-foot cut depth, approximately 1,000,000 cubic yards of beach compatible sand was located.

Zone 3

Zone 3 cores along the south end of the survey area (Figure 6) contained fine to medium sand mixed with a varying amount of silt and gravel in the form of carbonate rock fragments.

Cores 20 and 21 from the deeper area contained higher sand percentages and lower percentages of gravel and rock fragments compared to most cores taken in shallower water. Compared to shallower cores in this zone, the percentage of silt in the deep cores of Zone 3 was on the average slightly greater. This contrasts with the textural features of deep cores in Zone 2, which were less silty compared to the corresponding shallow cores of this zone. Overall, the texture of deep-water cores from Zone 3 can be considered consistent with the interpretation that sediments found at depths of 250 to 300 feet are the remnants of a shoreface related to an ancient low stand of sea level. The silt content of the sediment was originally considered marginally acceptable with a total volume of 6,000,000 cubic yards at a 12-foot dredge cut.

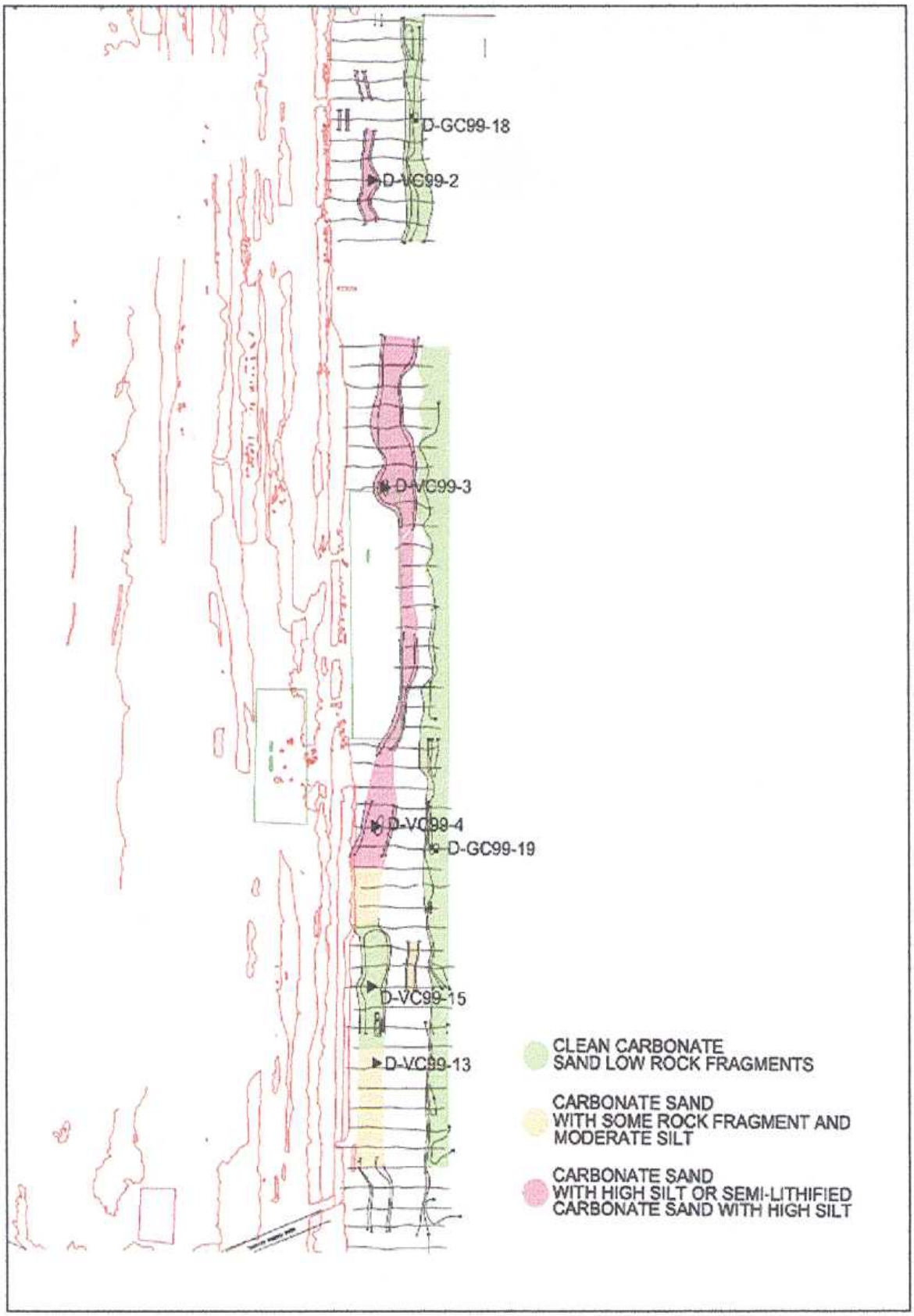

Figure 5. Zone 2 Vibracore Locations

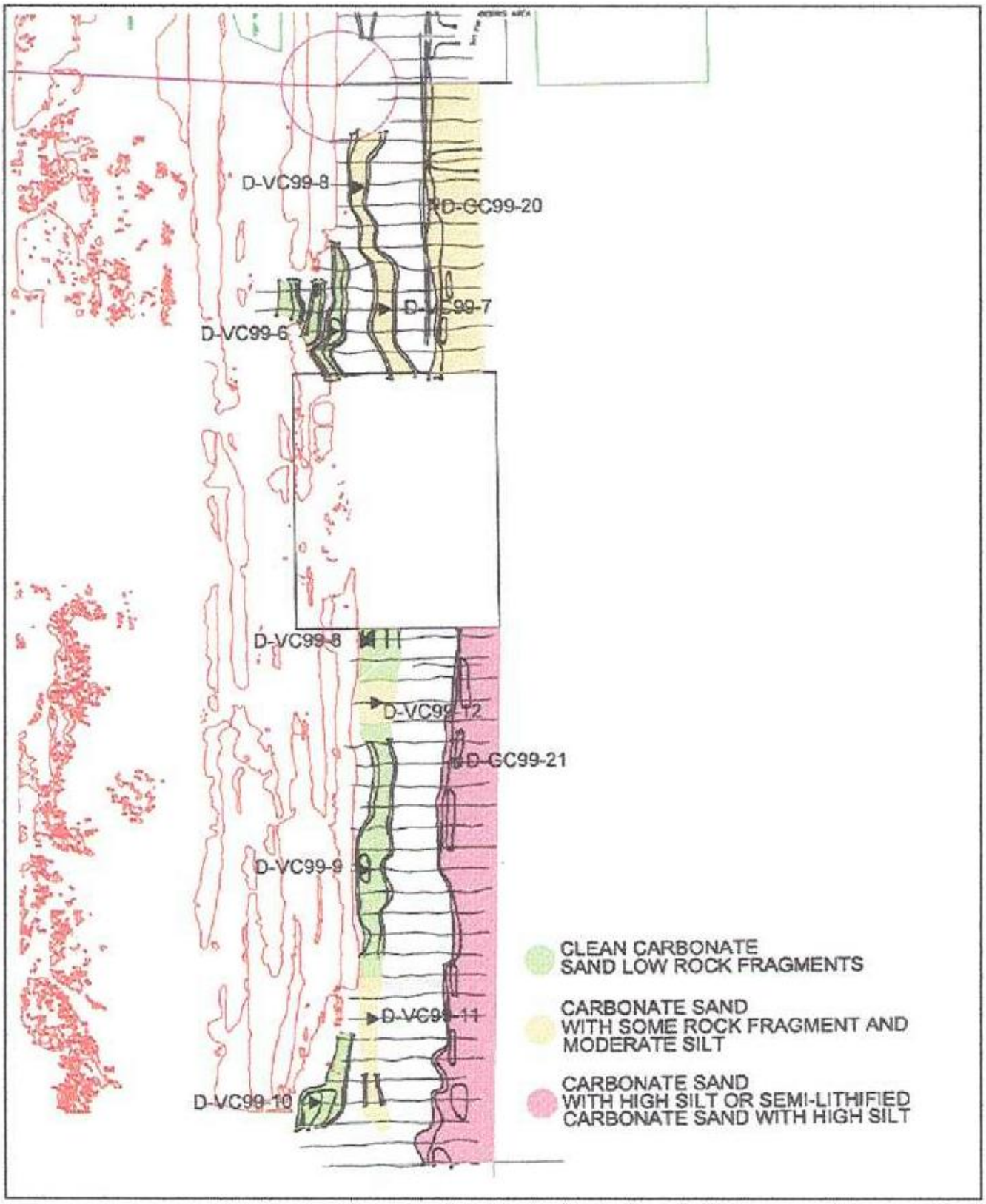

Figure 6. Zone 3 Vibracore Locations

State permits will not allow the placement of this material on the beach due to the silt content.

Cores 6, 7, 8, 9, 11, and 12 were taken in water depths of less than 160 feet where only a thin sediment overburden of 3 to 7 feet is indicated above the first sub-bottom reflector by the seismic records. Similar to the other cores from this depth range, carbonate rock fragments in the gravel size range were abundant and portions of the cores were semi-lithified. The report gave a total volume of beach compatible sand within the depth range of 130-240 feet at an estimated 1,900,000 cubic yards. Dredge cut depths would be limited to 3 to 5 feet. This area is considered marginal at best, with only borings 8 and 9 having acceptable silt contents. The high amounts of rock and thin sand deposit make this an unlikely source of sand.

Cores 10 and 6, however, were taken in areas where the isopach is locally greater than ten feet. Core 10 contained 18 feet of relatively clean fine to medium carbonate sand. Silt content of this core was less than 5%. Core 6 contained 5.6 feet of fine to medium carbonate sand with no rock fragments typical of the adjacent cores. These two cores lie in water depths less than 100 feet adjacent to the reef. The combined volume of beach compatible sediment within the two areas is 1,400,000 cubic yards. Estimated cuts range from 4 to 20 feet based on seismic contours. The proximity to the reef may pose a problem, as the permits require buffer zones. The dimensions of the buffer zone will impact the volumes of these areas, decreasing the amount available for use. Based on this reconnaissance level survey, sediment recovered from Zone 3 can be rated better than Zone 1 and similar to Zone 2 with respect to sand resources potential to lower silt content and significant overburden in the area of Core 10. Seismic records and reconnaissance cores taken from depths less than 200 feet in zone 3 are similar to those from the same depth range in Zone 2. However, the cores from deeper water (250 feet) in Zone 3 contain slightly higher silt percentages compared to the two cores from the same depths in Zone 2. Seismic records from the deeper areas of Zone 3 indicate a persistent overburden of 15 feet of more.

SUMMARY

The northernmost zone, Zone 1, contained no material of beach quality due to the high silt content of the sediment. The central 8.3-mile long section designated Zone 2 holds greater potential for beach quality sand compared to the north and south sections of the survey. In the central section, recovered sediments included smaller silt fractions, as well as relatively low silt percentages in water depths greater than 250 feet. Cores 18 and 19 from deeper

water in Zone 2 were totally un-lithified and contained near zero percentages of rock fragments, as well as low silt content. This area has the greatest potential for beach quality sand. Sediment recovered in Zone 3 from the southernmost 7.5 miles of the survey area was characterized by a mixture of sand, gravel in the form of lithified carbonate rock fragments in shallower cores. Zone 3 silt percentages were similar to shallow cores of Zone 2 and do not meet current permit requirements. Some potential for beach quality material is present due to high percentages of sand in Cores 10 and 6 from this zone. Sediment was retrieved from a localized area of large sand deposits, Core 10 contained 18 feet of clean medium to fine sand mixed with carbonate gravel. It is possible that the volume of clean sand from this area is large enough to warrant further consideration for recovery. The close proximity to the reef structures may impact the volumes of these areas. Although the initial report estimates 20 million cubic yards of available material, current permit standards cuts that volume to approximately 10 million cubic yards.

The results of the Dade County Deep-water survey should be considered to be only at the reconnaissance level due to the limited spatial resolution of the sub-bottom seismic survey and limited number of cores recovered. However, the results of this broad-based low-resolution survey are encouraging enough to recommend further, more detailed investigations to determine the specific quantity and qualities of sand available.

e. Borrow Sites Offshore Palm Beach County

The Coast of Florida Study identified large quantities of sand resources offshore of northern Palm Beach County, more than three miles offshore in federal waters. Although these sources are available and suitable as a sand source for beach renourishment, it is unlikely to be used for the Bal Harbor project. In general these sand deposits are approximately 60 miles from Miami.

f. Newly-Developed Borrow Sites Offshore Martin County

Bryant and Associates have identified large sand sources in federal waters beyond the three-mile state jurisdictional limit. Two large shoals offshore of Martin and St. Lucie Counties, each containing an estimated 10,000,000 cubic yards of beach quality material, were identified and grab sampled. Figure 7 and Figure 8 show the borrow locations. Grain size data is included in the Appendix. The shoals are located in 30 to 50 feet of water and are approximately 90 miles from Miami.

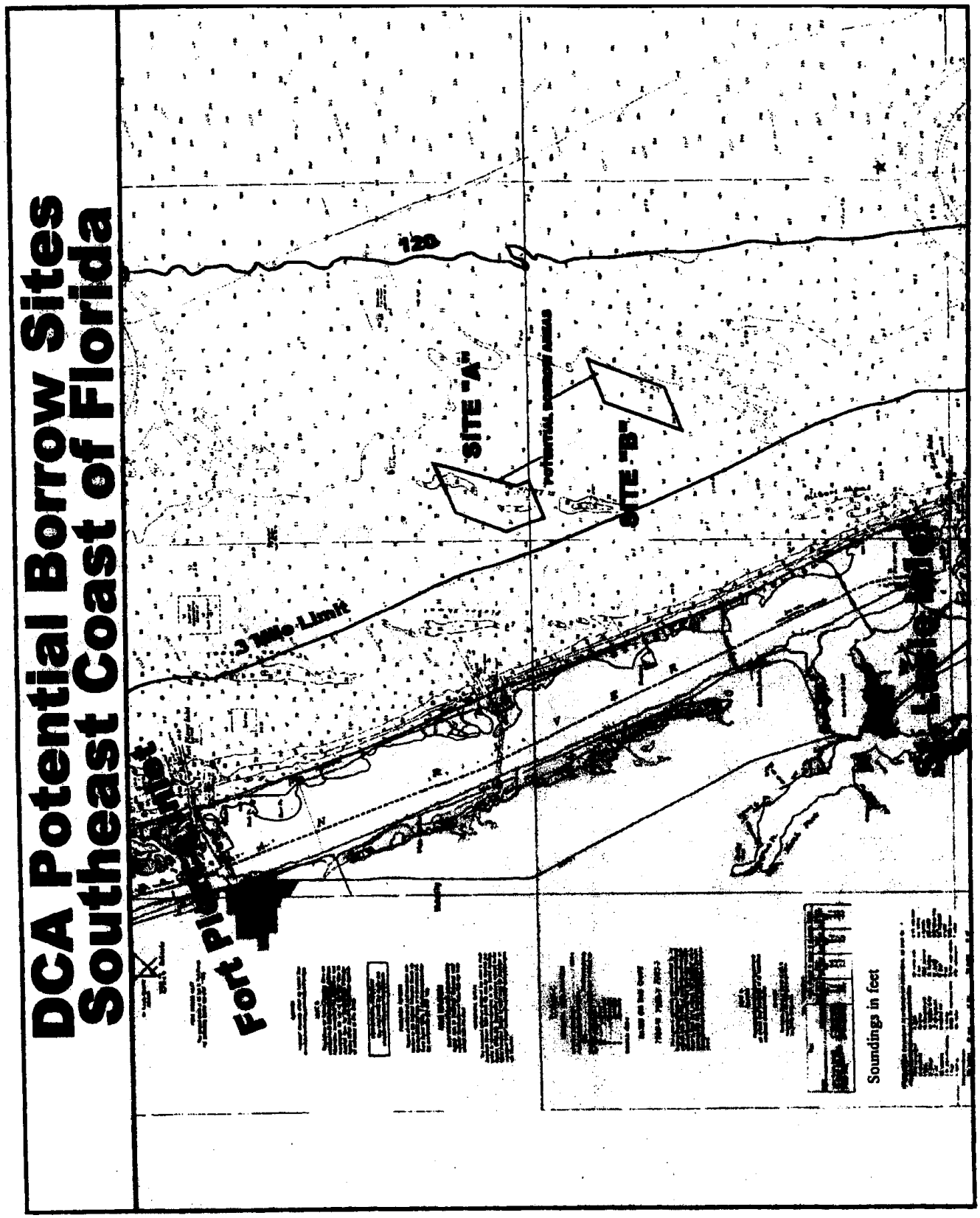

Figure 7. Potential Borrow Sites Offshore Martin and St. Lucie Counties

Figure 8. Potential Borrow Sites Offshore Martin and St. Lucie Counties (Enlargement)

g. Upland Borrow Sites

Upland commercial sand sources have yet to be tapped for large quantities of sand for beach nourishment in Florida. Quarrying operations at the above sites can be found in the report titled, “Dade County, Alternate Sand Source Investigation”, by Coastal Planning and Engineering, Inc., 1997, for the Corps of Engineers.

Many of the sand sources in Dade County produce manufactured sand. Local limestone is mined and processed into a sand and gravel product. The State of Florida, Department of Environmental Regulation has determined manufactured sand is unsuitable for beach nourishment due to the angular grains and its propensity to compact.

Transportation of the sand continues to be an issue, since Miami Beach has limited the amount of sand that may be truck hauled through the city. Barge delivery of the sand would be acceptable to Miami Beach, but only one known source has direct barge capabilities. Tarmac America can use barge or boats to transport their material, but has to mechanically transfer it from the truck to the boat because of a lack of infrastructure in the area for this type of transfer. The construction of the right type of infrastructure in Dade County may be beneficial to future beach nourishment projects by upland sand sources, but the evaluation of their cost effectiveness would have to be evaluated.

h. Carbonate/Aragonite from Bahamas and Turks and Caicos Islands

Additional sand resources for Dade County still include essentially unlimited quantities of calcium carbonate and oolitic aragonite sand from the Bahamas and Turks and Caicos (Figure 9). The closest source at Ocean Cay, Bahamas, is 60 miles from Miami.

Oolites are spherical grains of calcium carbonate ($CACO_3$) that precipitate out of agitated saline waters around a nucleus in a process similar to that of atmospheric hailstone formation. The concentric carbonate covering of modern, marine-formed oolites are comprised of the mineral aragonite. Table 4 compares the mineralogy of existing beach sediments to aragonite.

Table 5 shows summary of suppliers that were evaluated to have material acceptable for Dade County Beaches (Coastal Planning and Engineering, 1997).

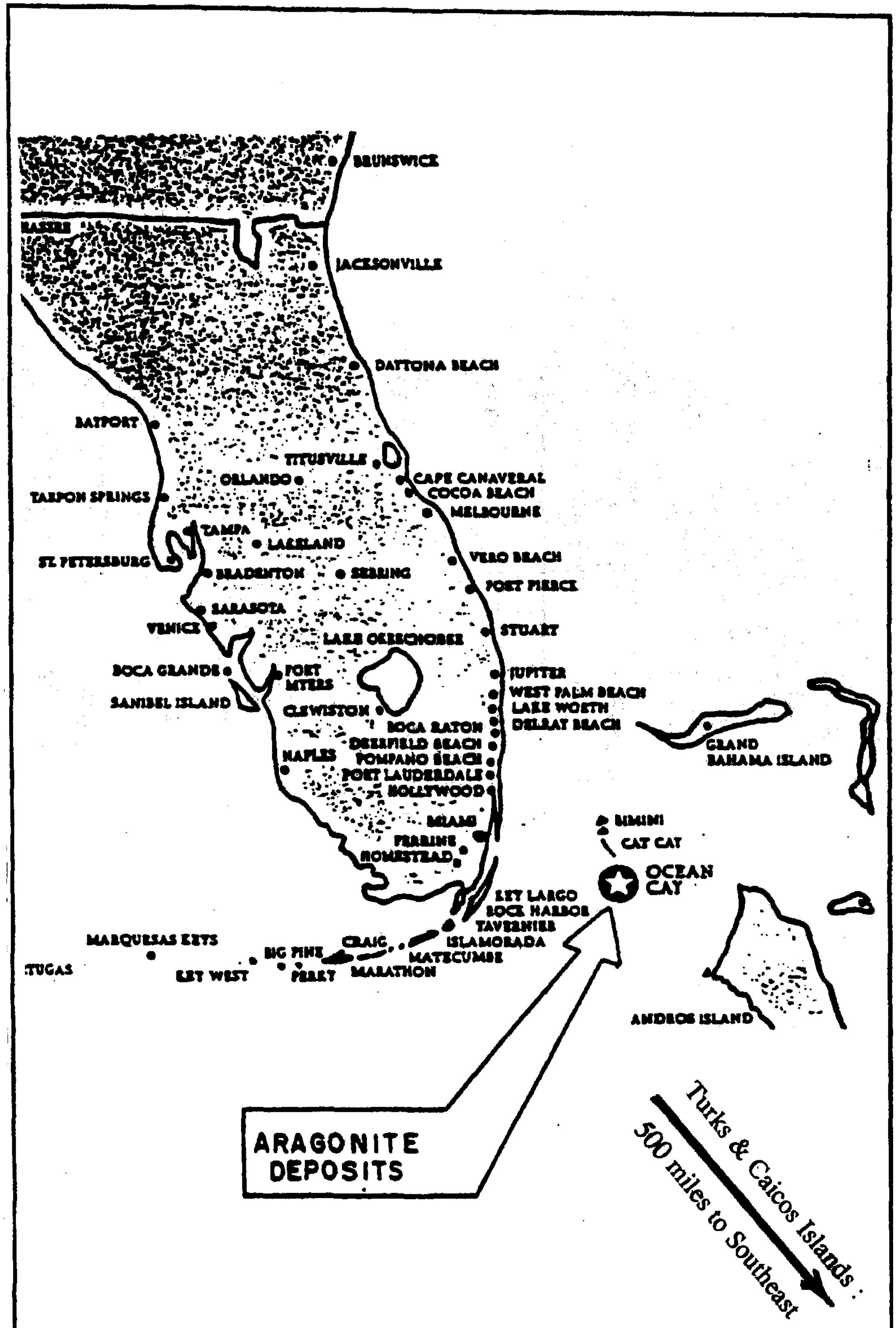

Figure 9. Location Map of Aragonite Deposits

Table 4. Comparison of Mineralogy

	Existing Beach		Fill Material
	Quartz	Shell/Coral Rock Fragments	Aragonite
Chemical Composition	SiO_2	$CaCO_3$	$CaCO_3$
Crystal System	Hexagonal	Hexagonal	Orthorhombic
Specific Gravity - Range Average	2.55 – 2.66 g/cm^3 2.65 g/cm^3	2.72 g/cm^3	2.85-2.94 g/cm^3
Hardness	7	3	3.5-4.0
Roundness/Shape	Round to subangular	Angular to Flat	Ooids–very round to elliptical
Color	Tan to Gray	White-Gray-Black	White-Gray-Brown
Solubility		$4.5x10^{-9}$	$6.0x10^{-9}$

Table 5. Evaluated Suppliers

Source	Grain Size	Composition	Silt Content	Cost/Ton	Overfill Ratio
Tarmac America Dade Co., FL COM	0.57 mm	70% CaCO3, 30% SiO2	2.65%	$4.50 FOB $7.50 Delivered	1.05
CRS Rinker Dade Co. (Krome Quarry)	0.39 mm	95% CaCO3, 5% SiSO2	4.47%	$4.00 FOB	1.07
Marcona Ocean Industries Ocean Cay Bahamas	0.31 mm	Aragonite	3.80%	$8.00 Delivered	1.09
Delancy Trading Turks & Caicos Islands, BWI	0.46mm	Aragonite	0.92%	N/A	<1.00
E.R. Jahna Ortona Mine SR 78	0.39 mm	SiO2	0.23%	$4.00 FOB	1.02
White Rock Quarries Dade Co., FL Fine	0.56 mm	95% CaCO3, 5% SiO2	2.04%	$5.75 FOB	1.04
Conrad Yelvington Distributors, Inc. Daytona, FL Medium Coarse	0.40 mm 0.50 mm	SiO2 SiO2	0.33% 0.64%	12.80 Delivered 13.30 Delivered	1.03 1.00
Standard Sand & Silica Lake Wales, FL	0.28 mm	SiO2	0.23%	$11.75 Delivered	1.14

Additional detail regarding testing methods and specific quarrying operations at the above sites can be found in the report titled, “Dade County, Alternate Sand Source Investigation”, by Coastal Planning and Engineering, Inc., 1997, for the Corps of Engineers.

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Strong bottom currents and upwelling of colder deep water into shallow warm waters are ideal conditions for the precipitation of aragonite and the formation of modern oolites. Such conditions are found in tidal inlets and across the surfaces of nearshore reefs; but the classic, modern setting, favorable for the formation of large quantities of oolites is the Bahamian rise and in the vicinity of other Caribbean islands where strong currents carry deep waters upward along steep island slopes and into warm, very shallow waters.

Olson and Bodge (1992) calculated that the aragonite median grain size would act as the equivalent of 1.36 times coarser than the native quartz grain size due to the higher settling velocity of the denser aragonite. Bahamian aragonite is very uniform and comprised of similar size spherical oolite grains and traces of elongated coral and skeletal fragments.

The suitability of aragonite as beach fill is related to fill stability, transport and beach profile characteristics (i.e. slope, profile shape and grain sorting). At the present time it is unknown how aragonite behaves as a beach fill and how it mixes with the existing beach. To date only one recent beach fill project using aragonite has been completed and monitored, the private project at Fisher Island (Olsen and Bodge, 1991). There is little opportunity

to assess the longshore or offshore movement of this aragonite placement due to the highly structured nature of the project, which has essentially formed six small semi-enclosed pocket beaches. Little published monitoring data is available on this project. The sediment characteristics of the aragonite used at this site were well-rounded, very smooth, oolitic aragonite from the Bahamas.

i. Ebb shoal at Bakers Haulover Inlet

The ebb tidal shoal is located in 15 to 20 feet of water northeast of Bakers Haulover Inlet (Figure 10 and Figure 11). The sand within the borrow area consists primarily of poorly graded, fine to medium-grained sand, slightly silty with carbonate fragments, shell and quartz sand. Bedrock exists below the borrow area as shown by core borings. In 1997 the total volume of sand in the ebb shoal was estimated to be approximately 630,000 cubic yards. The ebb shoal was utilized in 2003 for beach renourishment. The shoal is a sink for sand and is a good source for periodic renourishment.

j. Relocation from the South End to North End of the Project

The southerly littoral drift in Dade County transports much of the beach fill from the northern to the southern portion of the project (Figure 12). Recycling this eroded sand by hydraulic or mechanical means is one way to reduce borrow area quantities required and/or increase renourishment intervals.

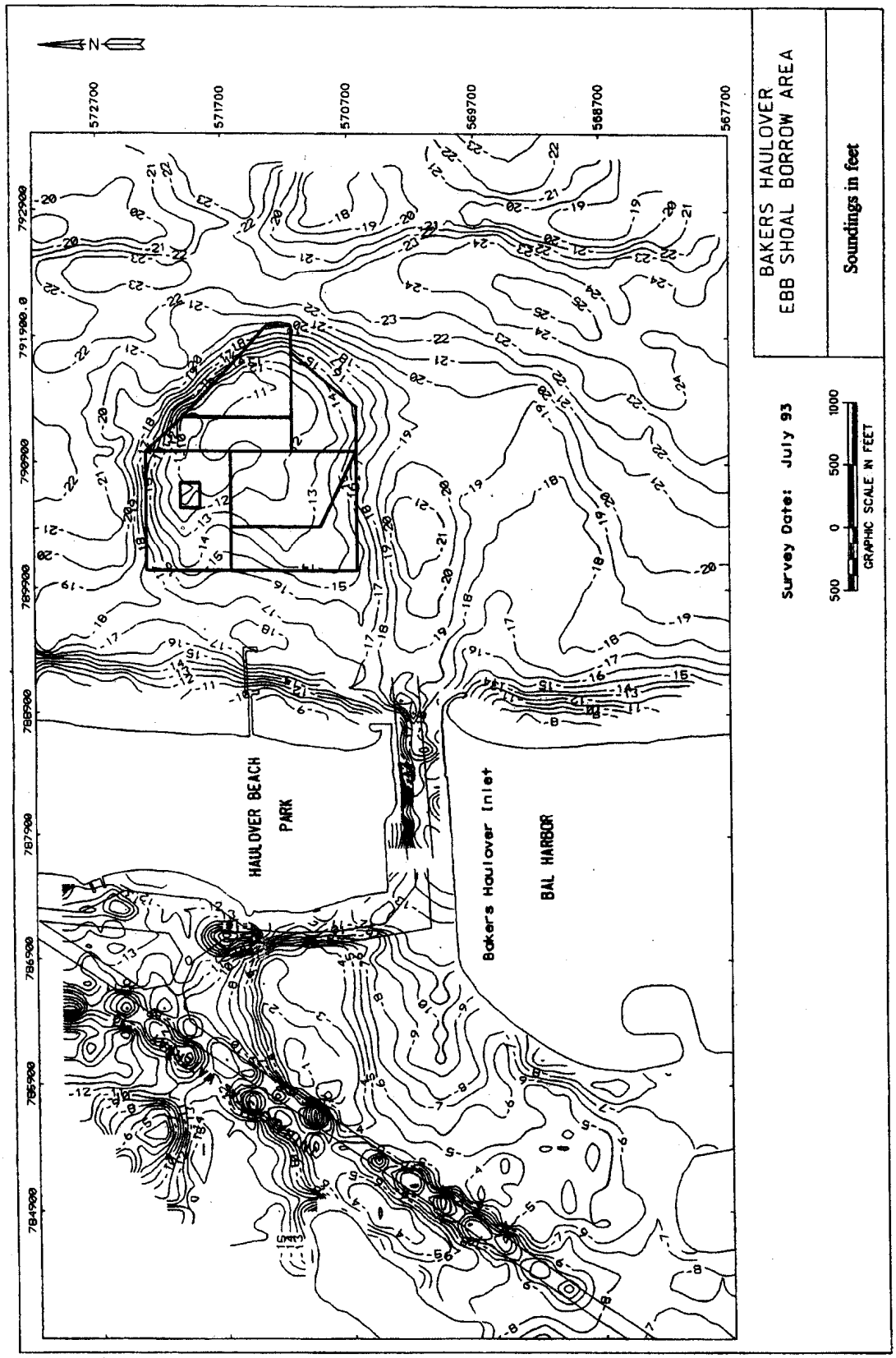


Figure 10. Bakers Haulover Ebb Shoal Borrow Area

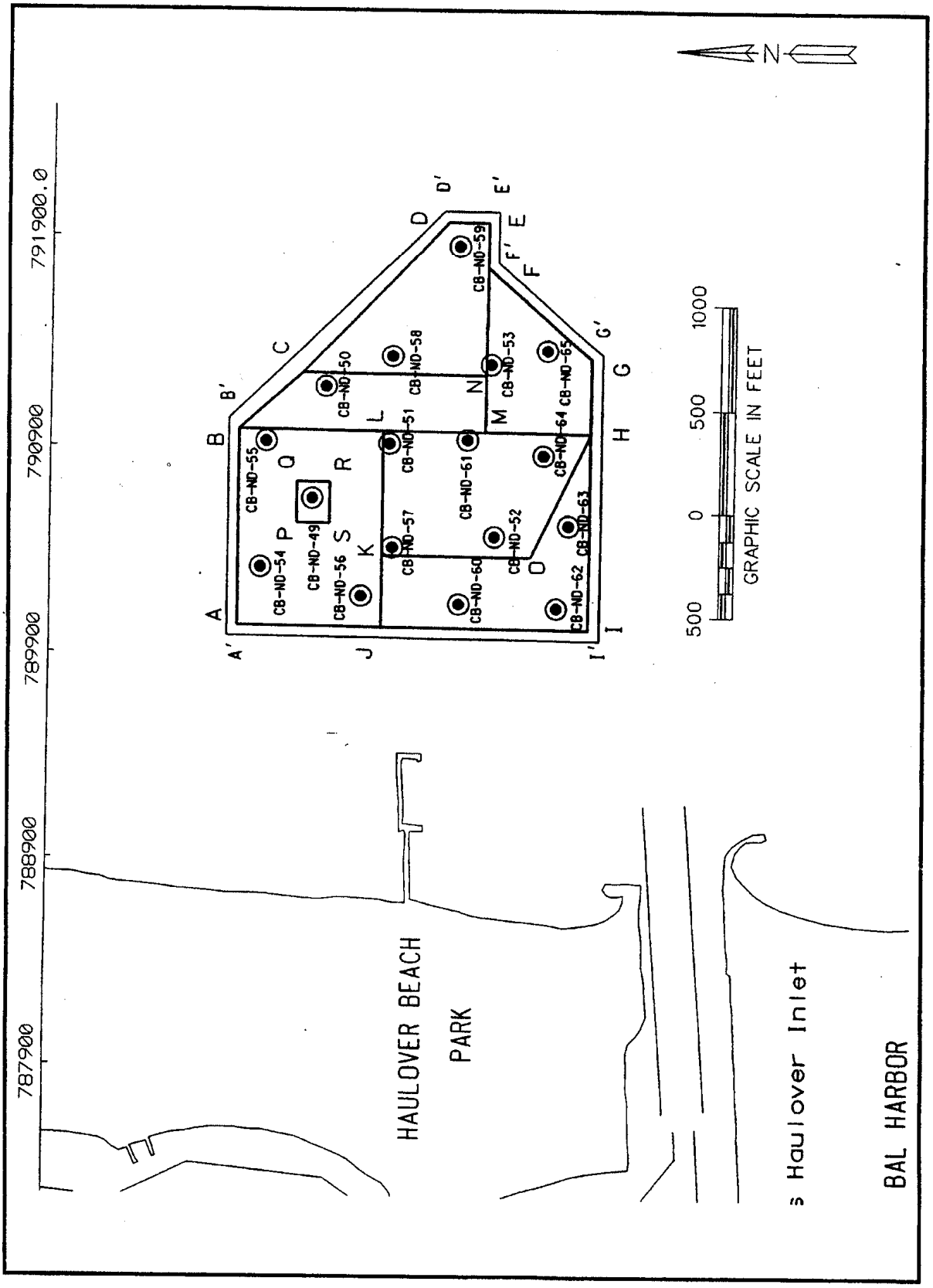


Figure 11. Core Boring Locators at Bakers Haulover Ebb Shoal

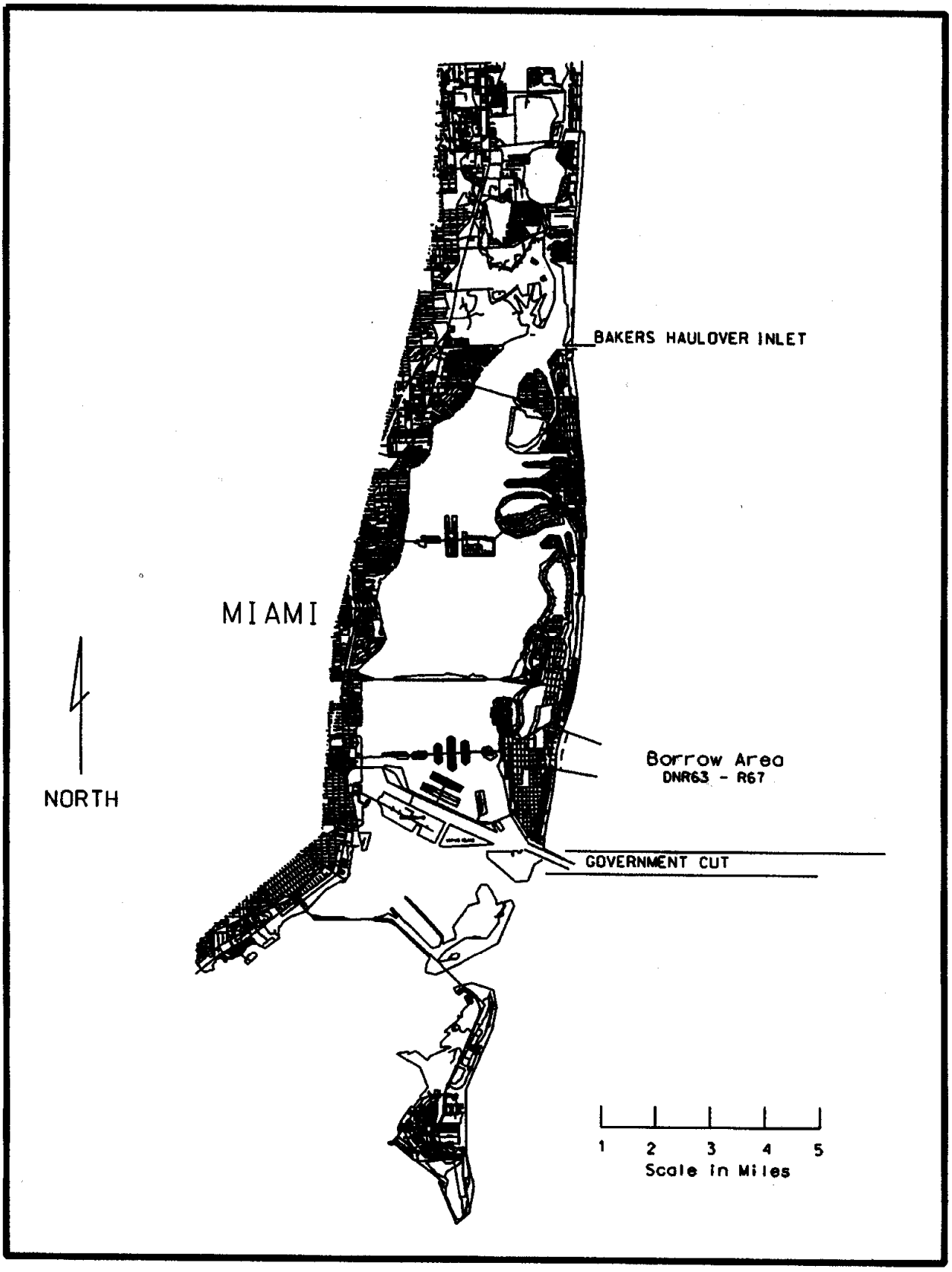


Figure 12. Sand Relocation Map

REFERENCES

Coastal Planning and Engineering, Deep Water Geotechnical Investigation of Offshore Sand Deposits for Beach Renourishment in Dade County, Florida. September 2000.

Coastal Planning and Engineering, Dade County Alternate Sand Source Investigation, September 1997.

Olsen, E.J. and K.R. Bodge. 1991. "The use of Aragonite as an Alternate Source of Beach Fill in Southeast Florida. "In: N.C. Kraus, K.J. Gingerich and D.L. Kriebel, eds. *Coastal Sediments '91 Volume II.* Pp. 2130-2144.

U.S. Army Corps of Engineers, "Dade County, Florida Beach Erosion Control and Hurricane Surge Protection Project, GDM Addendum II, June 1984.

Olson and Bodge, "Aragonite Beachfill at Fisher Island, Florida", Journal of the American Shore and Beach Preservation Association, January 199

Deep Water Dade

Dade Co. Deepwater Samples Mud and Coarse Fractions

SAMPLE	MUD%	SAND	GRAVEL	COARSE%
DCV-1-1.0	8.13%	42.87%	49.00%	91.87%
DCV-1-3.0	16.25%	73.75%	10.00%	83.75%
DCV-1-COMP	13.47%	66.53%	20.00%	86.53%
DCV-2-1.0	7.46%	59.54%	33.00%	92.54%
DCV-2-5.0	13.91%	59.09%	27.00%	86.09%
DCV-3R2-1.0	6.07%	58.93%	35.00%	93.93%
DCV-3R2-3.0	15.50%	53.50%	31.00%	84.50%
DCV-4-1.0	6.00%	68.00%	26.00%	94.00%
DCV-4-3.0	13.22%	81.78%	5.00%	86.78%
DCV-5-0.5	6.73%	71.27%	22.00%	93.27%
DCV-5-2.0	12.61%	86.39%	1.00%	87.39%
DCV-5-4.0	9.95%	58.05%	32.00%	90.05%
DCV-6R2-0.5	11.86%	88.14%	0.00%	88.14%
DCV-6R2-2.0	7.82%	92.18%	0.00%	92.18%
DCV-6R2-4.0	10.45%	89.55%	0.00%	89.55%
DCV-6R2-COMP	13.66%	86.34%	0.00%	86.34%
DCV-7-0.5	3.95%	82.05%	14.00%	96.05%
DCV-8-0.5	8.12%	88.88%	3.00%	91.88%
DCV-8-3.0	12.08%	63.92%	24.00%	87.92%
DCV-8-7.0	4.50%	95.50%	0.00%	95.50%
DCV-8-COMP	5.76%	82.24%	12.00%	94.24%
DCV-9-1.0	7.45%	41.55%	51.00%	92.55%
DCV-9-3.0	5.42%	94.58%	0.00%	94.58%
DCV-9-COMP	7.43%	82.57%	10.00%	92.57%
DCV-10-0.5	2.60%	97.40%	0.00%	97.40%
DCV-10-2.0	3.29%	94.71%	2.00%	96.71%
DCV-10-7.0	2.90%	82.10%	15.00%	97.10%
DCV-10-12.0	14.87%	85.13%	0.00%	85.13%
DCV-10-COMP	15.15%	82.85%	2.00%	84.85%
DCV-11-1.0	11.16%	76.84%	12.00%	88.84%
DCV-11-3.0	15.33%	82.67%	2.00%	84.67%
DCV-12-2.0	17.11%	76.89%	6.00%	82.89%
DCV-12-6.0	5.27%	93.73%	1.00%	94.73%
DCV-13-1.0	7.27%	59.73%	33.00%	92.73%
DCV-13-4.0	11.10%	86.90%	2.00%	88.90%
DCV-15-1.0	4.53%	94.47%	1.00%	95.47%
DCV-15-5.0	12.48%	87.52%	0.00%	87.52%
DCV-15-COMP 1	8.61%	88.39%	3.00%	91.39%
DCV-15-COMP 2	9.65%	90.35%	0.00%	90.35%
DCV-16-3.0	17.05%	70.95%	12.00%	82.95%
DCG-17-1.0	21.84%	78.16%	0.00%	78.16%
DCG-17-4.0	22.66%	76.34%	1.00%	77.34%
DCG-17-6.0	26.64%	73.36%	0.00%	73.36%
DCG-17-COMP	19.59%	80.41%	0.00%	80.41%
DCG-18R2-1.0	9.00%	91.00%	0.00%	91.00%
DCG-18R2-COMP	9.61%	89.39%	1.00%	90.39%
DCG-19-2.0	8.11%	90.89%	1.00%	91.89%
DCG-19-COMP	6.90%	93.10%	0.00%	93.10%
DCG-20R3-1.0	12.82%	87.18%	0.00%	87.18%
DCG-21-2.0	23.78%	76.22%	0.00%	76.22%
DCG-21-COMP	11.57%	88.43%	0.00%	88.43%

Hole No. DCV 99-6R2

DRILLING LOG | DIVISION | INSTALLATION | SHEET 1 OF 1

1. PROJECT: Dade County Deepwater Geotechnical Study
2. LOCATION (Coordinates or Station): X=956757.100 Y=504431.200
3. DRILLING AGENCY: SEA, Inc./Alpine OSS
4. HOLE NO. (As shown on drawing title and file number): DCV 99-6R2
5. NAME OF DRILLER: Alpine OSS
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.
9. TOTAL DEPTH OF HOLE: 7.0 Ft.
10. SIZE AND TYPE OF BIT: 4" VIBRACORE
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLLW
12. MANUFACTURER'S DESIGNATION OF DRILL: PNEUMATIC VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 3 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE STARTED: 12-10-99 COMPLETED: 12-10-99
17. ELEVATION TOP OF HOLE: -74.6 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 79 %
19. SIGNATURE OF G. ZARILLO, SEA,INC

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-74.6	.0					-74.6
			Pale brown to white medium to fine carbonate sand, shell fragments to 1/2 inch. 10 YR 8/1-8/2 (SP-GW)	100	0.5 2.0 4.0	Gravel layer, 2.7-2.9 ft.
-80.2	5.6					-80.2
-81.6	7.0			0		-81.6
			Penetration depth			Composite 0-5.6 ft.

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1838 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT	HOLE NUMBER
Dade County Deepwater Geotechnical Study	DCV 99-6R2

Sediment Analysis Data Sheet

Sample DCV-6R2-0.5

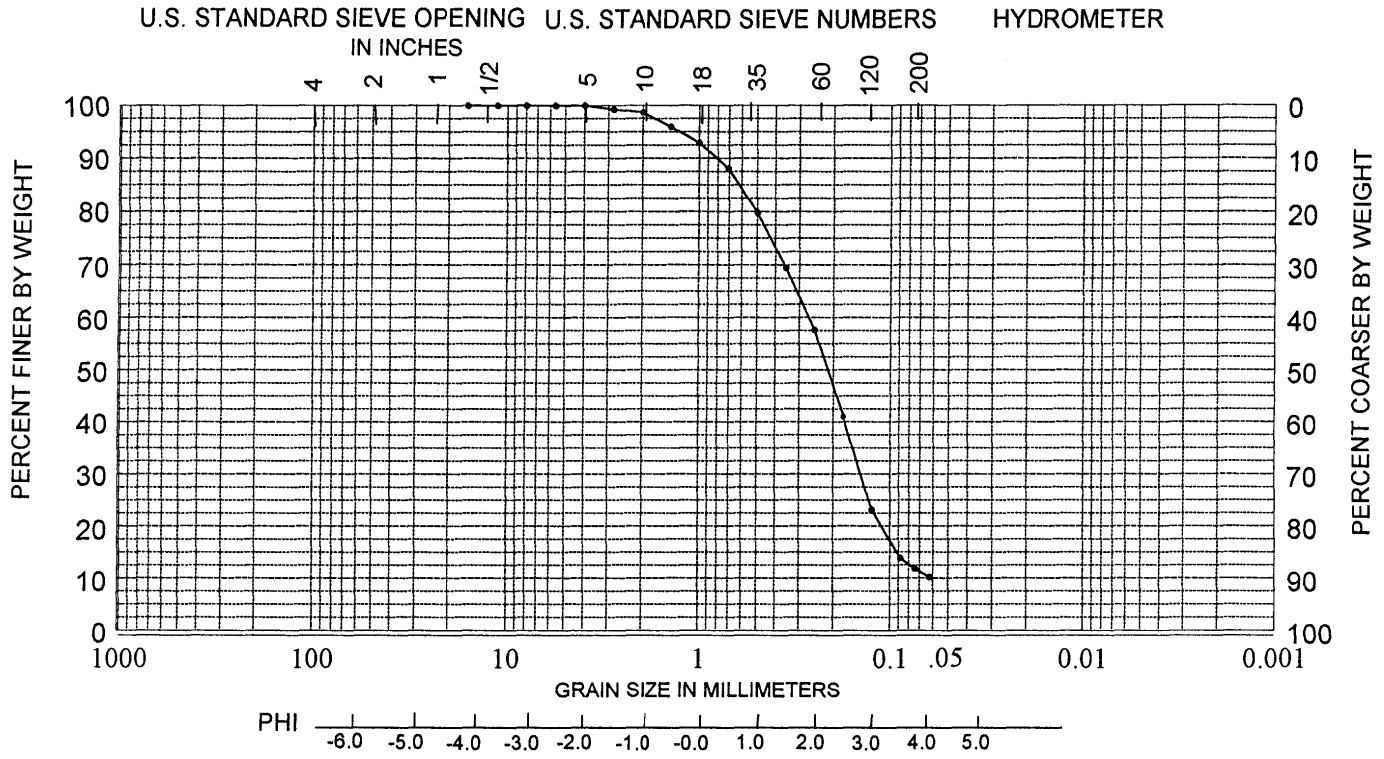
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.00	0.00	0.00
7	2.83	-1.50	0.24	0.72	0.72
10	2.00	-1.00	0.20	0.60	1.32
14	1.41	-0.50	0.87	2.67	3.99
18	1.00	0.00	0.99	3.03	7.02
25	0.71	0.50	1.59	4.87	11.89
35	0.50	1.00	2.70	8.28	20.17
45	0.35	1.50	3.36	10.30	30.46
60	0.25	2.00	3.85	11.83	42.29
80	0.18	2.50	5.43	16.65	58.94
120	0.13	3.00	5.80	17.78	76.72
170	0.09	3.50	3.06	9.37	86.09
200	0.07	3.75	0.67	2.05	88.14
230	0.06	4.00	0.51	1.55	89.69
Pan			0.07	0.21	89.90
Total			29.30	89.90	89.90

Folk Statistics	phi	mm
5% :	-0.33	1.26
16% :	0.75	0.60
25% :	1.23	0.42
50% :	2.23	0.21
75% :	2.95	0.13
84% :	3.39	0.10
95% :	4.20	0.05
Med.	2.23	0.21
Mean	2.12	0.23
St Dev.	1.35	
Skew	-0.13	
Kurt.	1.08	

Cu =	0.27		Gravel		0	%
			Coarse	Sand	1	%
			Med.	Sand	24	%
Cc =	0.08		Fine	Sand	63	%

Moment Statistics	Phi	mm
Mean	2.09	0.24
St. Dev.	1.18	0.44
Skewness	-0.89	
Kurtosis	3.26	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION
0.5	-75.1	Medium to fine sand (SP)

PROJECT	Dade County Deepwater Study
AREA	Dade Co., Florida
BORING NO.	DCV-6R2
DATE	March, 2000

Sediment Analysis Data Sheet

Sample DCV-6R2-2.0

Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.21	0.60	0.60
7	2.83	-1.50	0.10	0.28	0.88
10	2.00	-1.00	0.29	0.84	1.72
14	1.41	-0.50	1.15	3.32	5.04
18	1.00	0.00	1.06	3.06	8.10
25	0.71	0.50	1.79	5.15	13.24
35	0.50	1.00	2.97	8.57	21.81
45	0.35	1.50	3.77	10.85	32.67
60	0.25	2.00	4.45	12.83	45.49
80	0.18	2.50	6.31	18.20	63.70
120	0.13	3.00	6.81	19.64	83.33
170	0.09	3.50	2.58	7.43	90.77
200	0.07	3.75	0.49	1.41	92.18
230	0.06	4.00	0.21	0.61	92.79
Pan			0.04	0.11	92.90
Total			32.23	92.90	92.90

Folk Statistics		phi	mm
5%	:	-0.51	1.42
16%	:	0.66	0.63
25%	:	1.15	0.45
50%	:	2.12	0.23
75%	:	2.79	0.14
84%	:	3.04	0.12
95%	:	4.10	0.06
Med.		2.12	0.23
Mean		1.94	0.26
St Dev.		1.29	
Skew		-0.18	
Kurt.		1.15	

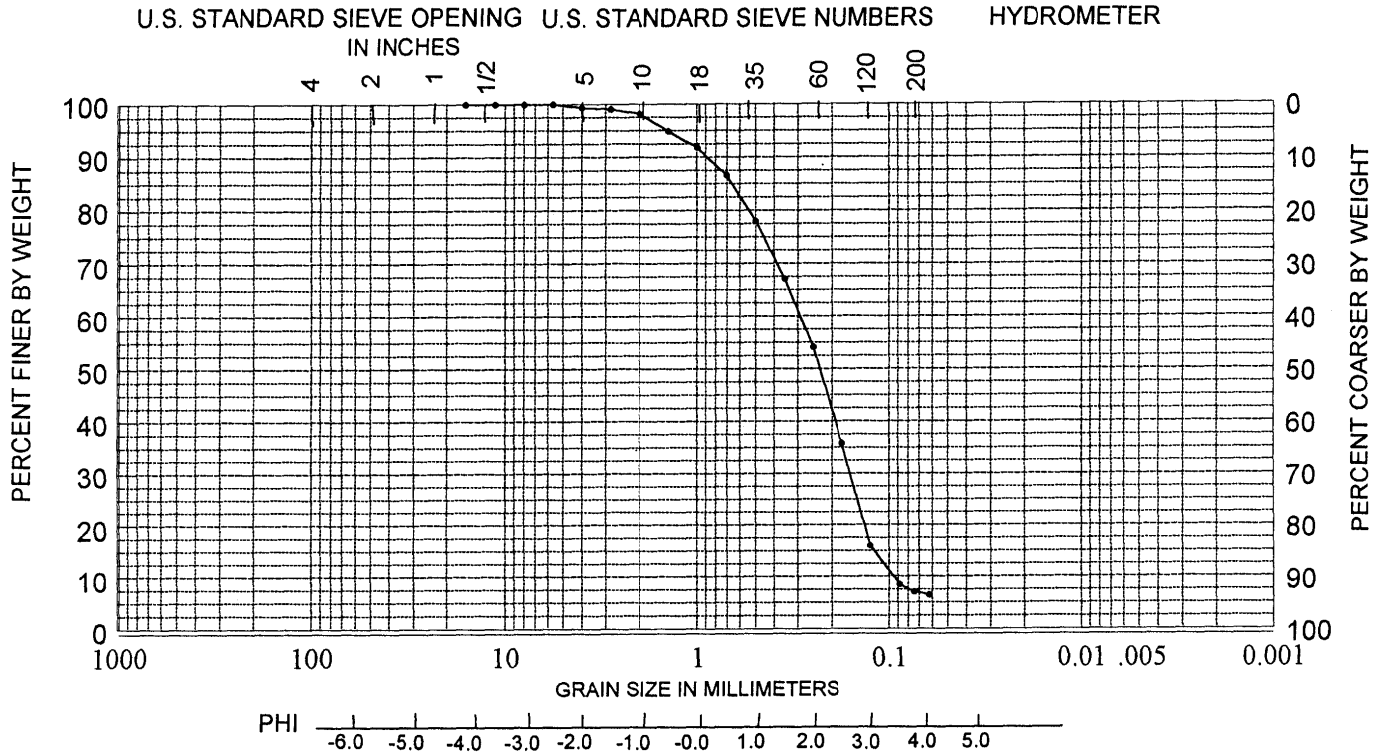
Moment Statistics	Phi	mm
Mean	2.00	0.25
St. Dev.	1.19	0.44
Skewness	-1.00	
Kurtosis	3.71	

Cu = 3.17

Cc = 0.94

Gravel		0	%
Coarse	Sand	1	%
Med.	Sand	26	%
Fine	Sand	65	%

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	
2.0	-76.6	Medium to fine sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-6R2
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-6R2-4.0

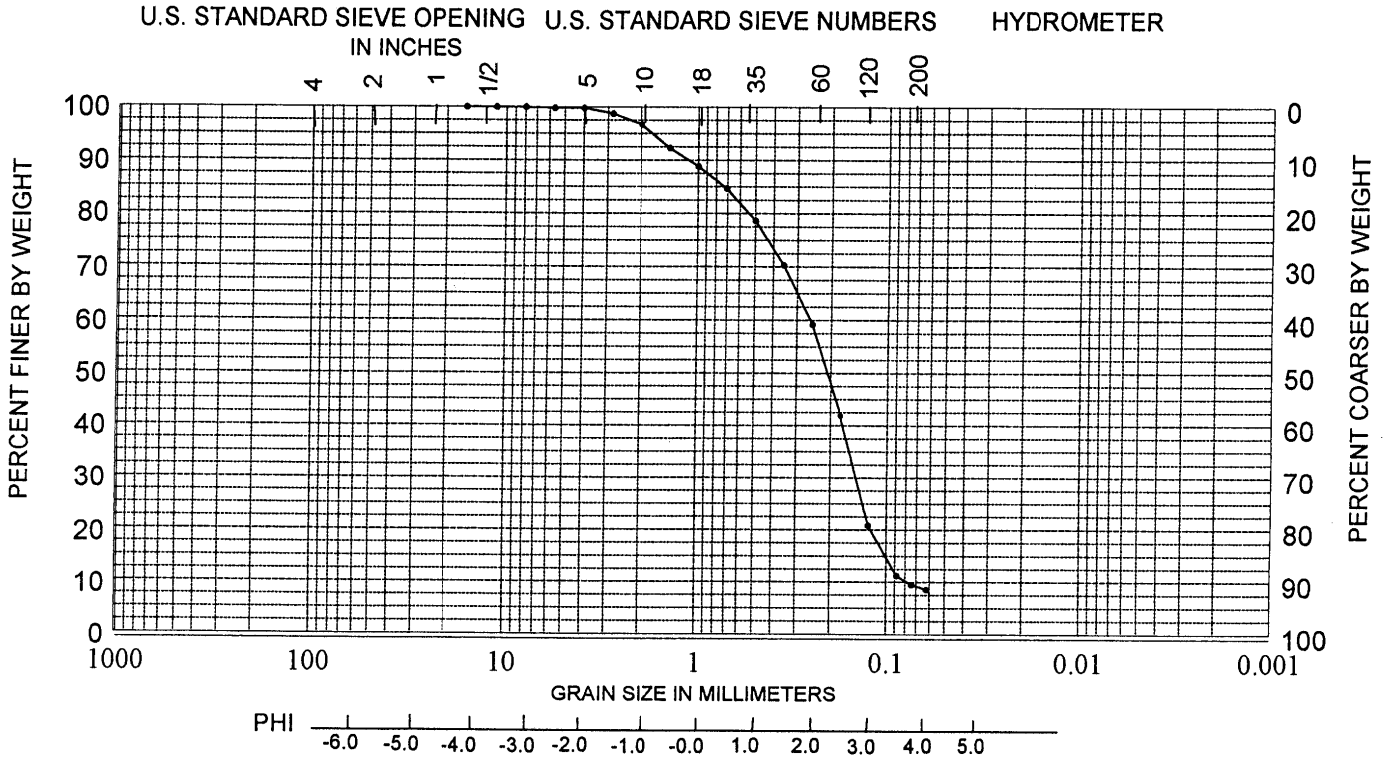
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.07	0.19	0.19
5	4.00	-2.00	0.00	0.00	0.19
7	2.83	-1.50	0.34	1.00	1.19
10	2.00	-1.00	0.68	2.01	3.20
14	1.41	-0.50	1.50	4.43	7.63
18	1.00	0.00	1.15	3.41	11.04
25	0.71	0.50	1.38	4.06	15.10
35	0.50	1.00	2.04	6.01	21.11
45	0.35	1.50	2.80	8.26	29.37
60	0.25	2.00	3.71	10.93	40.30
80	0.18	2.50	5.82	17.17	57.47
120	0.13	3.00	7.05	20.81	78.29
170	0.09	3.50	3.23	9.53	87.81
200	0.07	3.75	0.59	1.74	89.55
230	0.06	4.00	0.31	0.91	90.46
Pan			0.01	0.04	90.50
Total			30.67	90.50	90.50

Folk Statistics		phi	mm
5%	:	-0.80	1.74
16%	:	0.58	0.67
25%	:	1.24	0.42
50%	:	2.28	0.21
75%	:	2.92	0.13
84%	:	3.30	0.10
95%	:	4.10	0.06
Med.		2.28	0.21
Mean		2.05	0.24
St Dev.		1.42	
Skew		-0.26	
Kurt.		1.19	

Cu =	0.00	Gravel		0	%
		Coarse	Sand	3	%
		Med.	Sand	22	%
Cc =	0.00	Fine	Sand	64	%

Moment Statistics	Phi	mm
Mean	2.02	0.25
St. Dev.	1.33	0.40
Skewness	-1.08	
Kurtosis	3.43	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	PROJECT Dade County Deepwater Study
4.0	-78.6	Medium to fine sand (SP)	AREA Dade Co., Florida
			BORING NO. DCV-6R2
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-6 R2-COMP

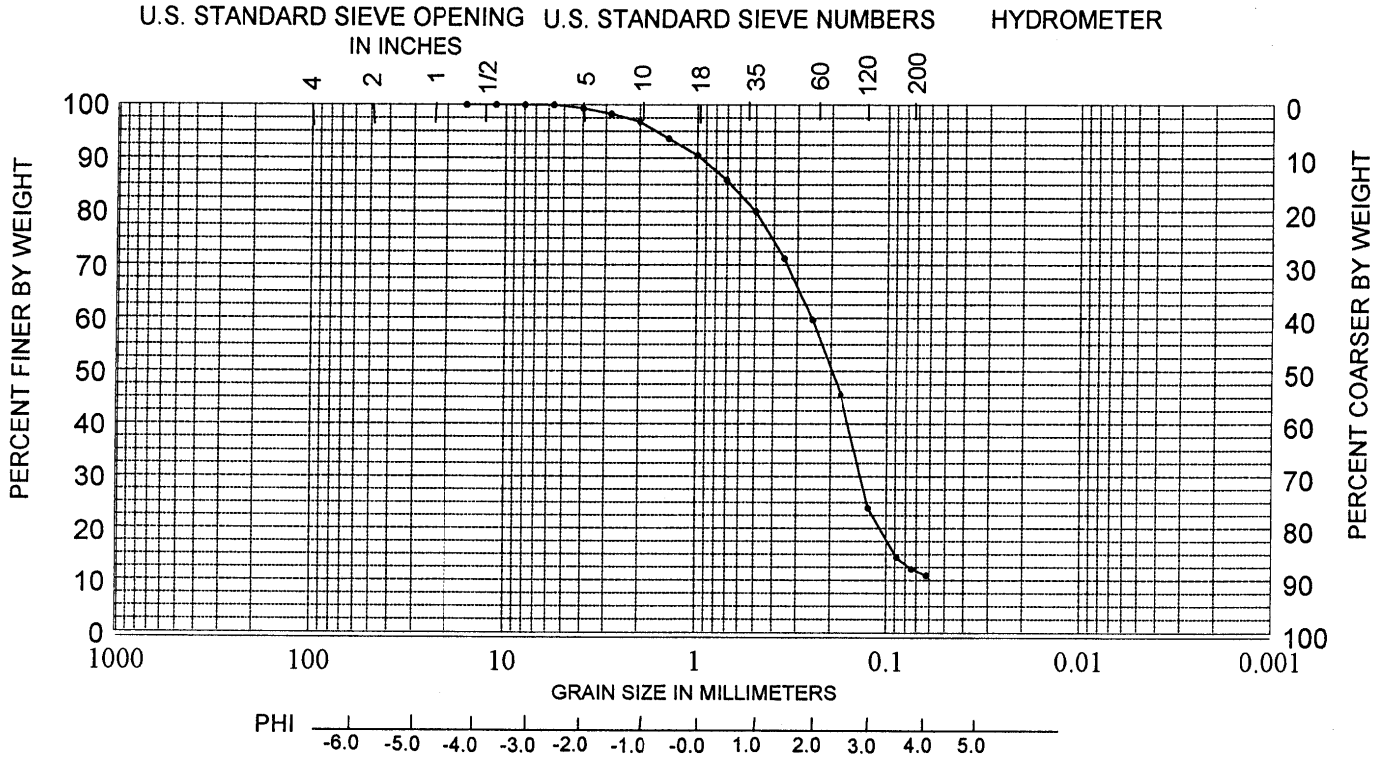
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.31	0.61	0.61
7	2.83	-1.50	0.51	1.01	1.62
10	2.00	-1.00	0.75	1.48	3.10
14	1.41	-0.50	1.55	3.06	6.16
18	1.00	0.00	1.61	3.16	9.32
25	0.71	0.50	2.29	4.52	13.84
35	0.50	1.00	2.89	5.70	19.54
45	0.35	1.50	4.41	8.70	28.25
60	0.25	2.00	5.76	11.36	39.61
80	0.18	2.50	7.02	13.84	53.45
120	0.13	3.00	10.82	21.33	74.78
170	0.09	3.50	4.75	9.37	84.15
200	0.07	3.75	1.11	2.19	86.34
230	0.06	4.00	0.60	1.19	87.53
Pan			0.09	0.17	87.70
Total			44.48	87.70	87.70

Folk Statistics		phi	mm
5%	:	-0.69	1.61
16%	:	0.69	0.62
25%	:	1.31	0.40
50%	:	2.38	0.19
75%	:	3.01	0.12
84%	:	3.49	0.09
95%	:	4.30	0.05
Med.		2.38	0.19
Mean		2.19	0.22
St Dev.		1.46	
Skew		-0.22	
Kurt.		1.20	

Cu =	0.25	Gravel		0	%
		Coarse	Sand	3	%
		Med.	Sand	21	%
Cc =	0.07	Fine	Sand	62	%

Moment Statistics	Phi	mm
Mean	2.06	0.24
St. Dev.	1.31	0.40
Skewness	-1.12	
Kurtosis	3.66	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	
COMP		Fine sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-6R2
			DATE March, 2000

Hole No. DCV 99-8

DRILLING LOG | DIVISION | INSTALLATION | SHEET 1 OF 1

1. PROJECT: Dade County Deepwater Geotechnical Study
2. LOCATION (Coordinates or Station): X=957881.100 Y=493427.900
3. DRILLING AGENCY: SEA, Inc./Alpine OSS
4. HOLE NO. (As shown on drawing title and file number): DCV 99-8
5. NAME OF DRILLER: Alpine Oss
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.
9. TOTAL DEPTH OF HOLE: 12.2 Ft.
10. SIZE AND TYPE OF BIT: 4" VIBRACORE
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLLW
12. MANUFACTURER'S DESIGNATION OF DRILL: PNEUMATIC VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 3 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE STARTED: 12-10-99 COMPLETED: 12-10-99
17. ELEVATION TOP OF HOLE: -132.5 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 75 %
19. SIGNATURE OF G. ZARILLO, SEA,INC

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-132.5	.0					-132.5
			Very pale brown to white medium to fine carbonate sand, large reef rock fragments to 4 inches. 10 YR 8/1-8/2 (SP-GW)	100	0.5	Large sand-filled worm tube, 0-0.7 ft.
						Large rock fragment, 1.2 ft.
-135.4	2.9				3.0	
			Pale brown to medium white, medium carbonate sand, scattered large shell fragments to 2 inches. 10 YR 8/1-8/3 (SP)			
-137.4	4.9					-137.5
			Pale brown fine carbonate sand. 10 YR 8/2 (SP)	100	7.0	
-141.7	9.2					-141.7
				0		
-144.7	12.2					-144.7
			Penetration depth			
						Composite 0-8.4 ft.

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: Dade County Deepwater Geotechnical Study | HOLE NUMBER: DCV 99-8

Sediment Analysis Data Sheet

Sample DCV-8-0.5

Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.59	1.45	1.45
	5.66	-2.50	0.36	0.88	2.33
5	4.00	-2.00	0.71	1.75	4.08
7	2.83	-1.50	1.68	4.15	8.24
10	2.00	-1.00	1.25	3.09	11.33
14	1.41	-0.50	2.03	5.01	16.34
18	1.00	0.00	3.02	7.45	23.79
25	0.71	0.50	3.75	9.24	33.03
35	0.50	1.00	3.09	7.62	40.65
45	0.35	1.50	3.74	9.24	49.89
60	0.25	2.00	4.18	10.31	60.20
80	0.18	2.50	5.48	13.53	73.73
120	0.13	3.00	5.32	13.14	86.87
170	0.09	3.50	1.56	3.85	90.73
200	0.07	3.75	0.47	1.15	91.88
230	0.06	4.00	0.36	0.90	92.77
Pan			0.42	1.03	93.80
Total			38.01	93.80	93.80

Folk Statistics		phi	mm
5%	:	-1.89	3.71
16%	:	-0.53	1.45
25%	:	0.07	0.96
50%	:	1.51	0.35
75%	:	2.55	0.17
84%	:	2.89	0.13
95%	:	4.20	0.05
Med.		1.51	0.35
Mean		1.29	0.41
St Dev.		1.78	
Skew		-0.15	
Kurt.		1.01	

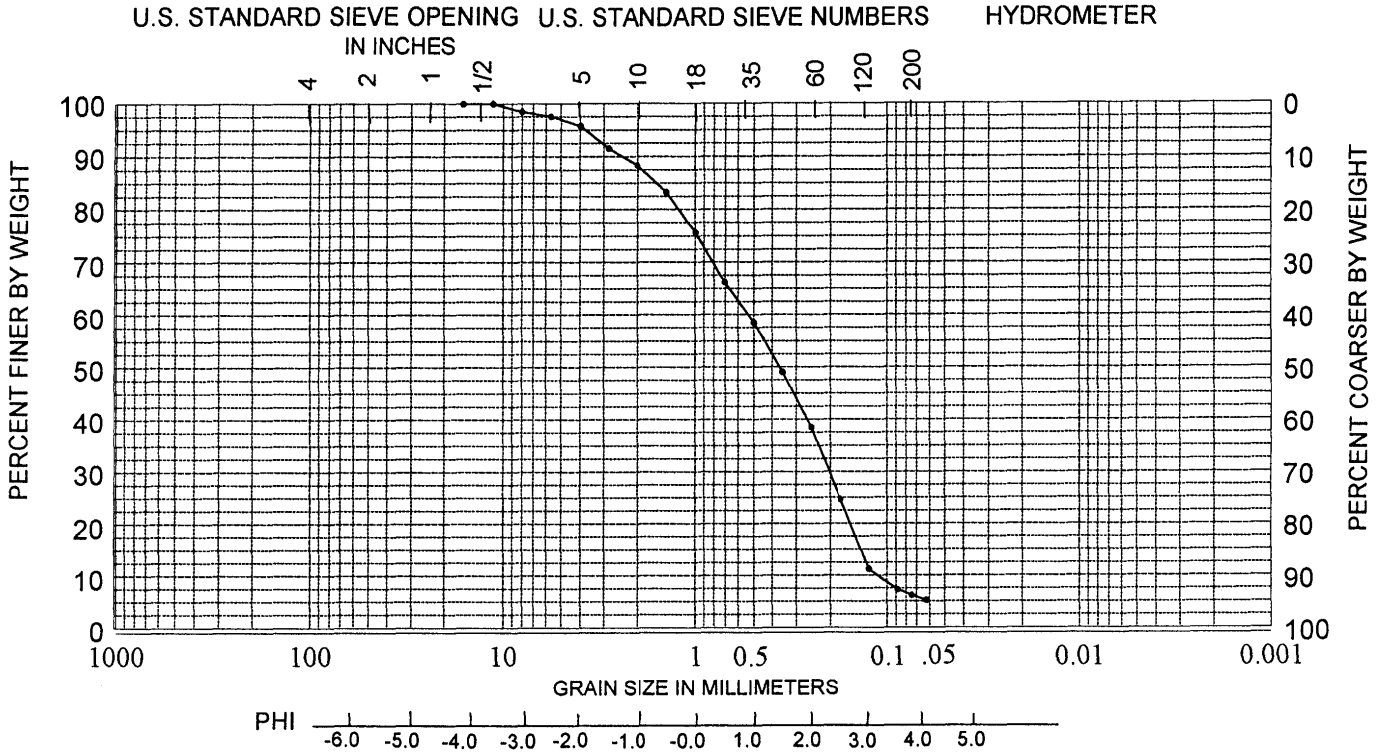
Moment Statistics	Phi	mm
Mean	1.23	0.43
St. Dev.	1.67	0.32
Skewness	-0.70	
Kurtosis	2.66	

Cu = 5.46

Cc = 0.78

Gravel		3	%
Coarse	Sand	8	%
Med.	Sand	34	%
Fine	Sand	47	%

SEA, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
0.5	-133.0	Medium to fine sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-8
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-8-3.0

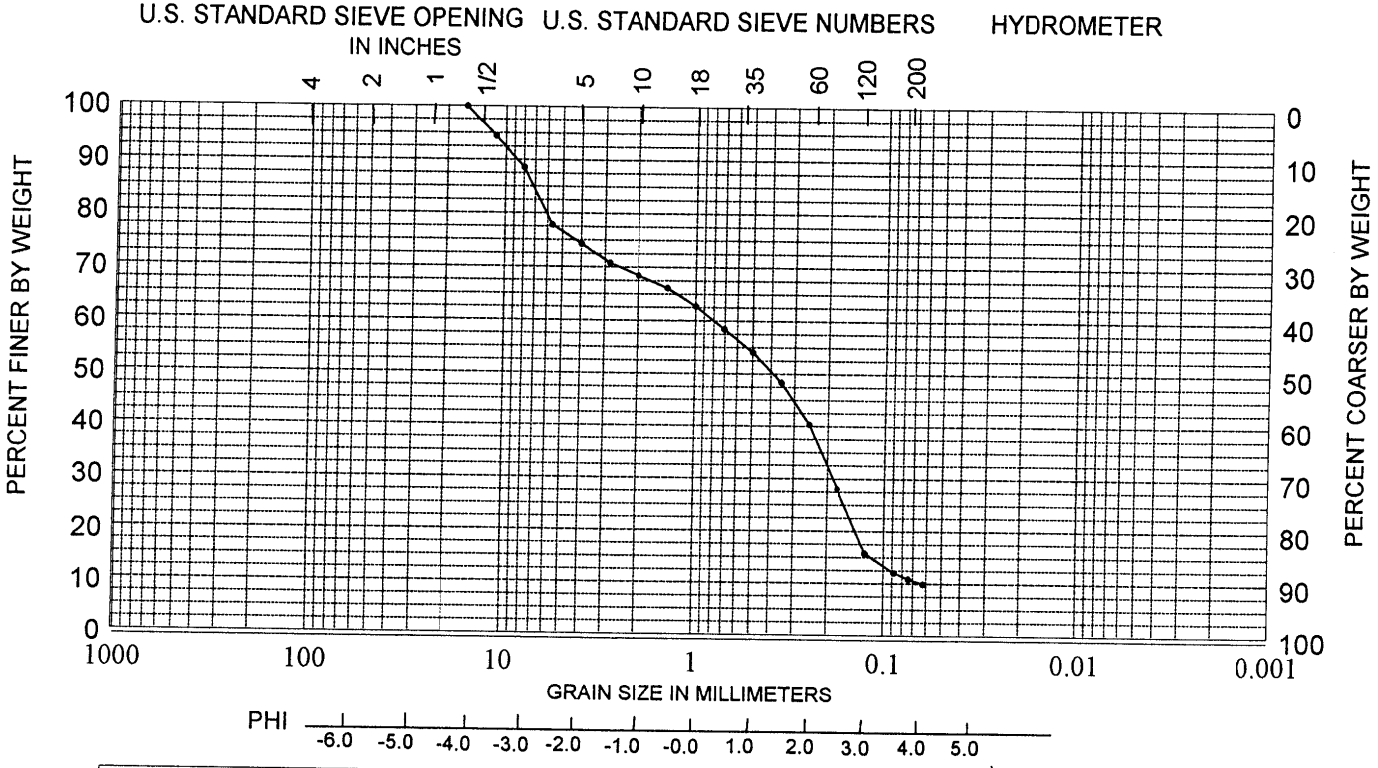
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	2.02	5.42	5.42
	8.00	-3.00	2.17	5.84	11.26
	5.66	-2.50	3.95	10.62	21.87
5	4.00	-2.00	1.28	3.44	25.32
7	2.83	-1.50	1.28	3.44	28.75
10	2.00	-1.00	0.85	2.29	31.05
14	1.41	-0.50	0.87	2.33	33.38
18	1.00	0.00	1.25	3.36	36.74
25	0.71	0.50	1.57	4.21	40.95
35	0.50	1.00	1.57	4.23	45.18
45	0.35	1.50	2.14	5.75	50.93
60	0.25	2.00	2.93	7.88	58.81
80	0.18	2.50	4.48	12.05	70.85
120	0.13	3.00	4.52	12.16	83.01
170	0.09	3.50	1.38	3.70	86.71
200	0.07	3.75	0.45	1.22	87.92
230	0.06	4.00	0.33	0.88	88.80
Pan			0.11	0.30	89.10
Total			33.14	89.10	89.10

Folk Statistics	phi	mm
5% :	-3.54	11.62
16% :	-2.78	6.85
25% :	-2.05	4.13
50% :	1.42	0.37
75% :	2.67	0.16
84% :	3.13	0.11
95% :	4.20	0.05
Med.	1.42	0.37
Mean	0.59	0.66
St Dev.	2.65	
Skew	-0.35	
Kurt.	0.67	

Moment Statistics	Phi	mm
Mean	0.35	0.78
St. Dev.	2.49	0.18
Skewness	-0.38	
Kurtosis	1.53	

Cu =	0.76	Gravel		24	%
		Coarse	Sand	7	%
		Med.	Sand	17	%
Cc =	0.04	Fine	Sand	40	%

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	
3.0	-135.5	Gravel and fine sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-8
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-8-7.0

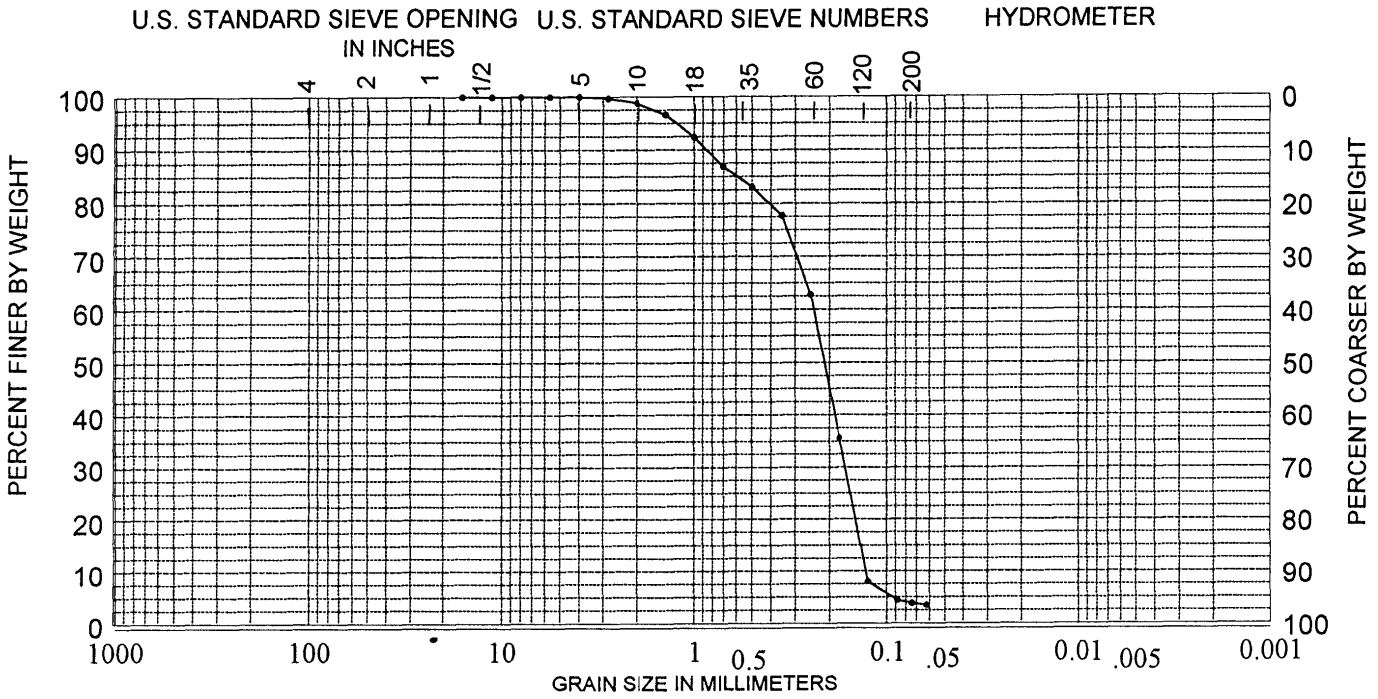
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.00	0.00	0.00
7	2.83	-1.50	0.15	0.32	0.32
10	2.00	-1.00	0.42	0.89	1.21
14	1.41	-0.50	0.96	2.06	3.28
18	1.00	0.00	1.98	4.24	7.52
25	0.71	0.50	2.54	5.47	12.99
35	0.50	1.00	1.74	3.74	16.72
45	0.35	1.50	2.50	5.37	22.09
60	0.25	2.00	6.87	14.77	36.86
80	0.18	2.50	12.60	27.07	63.93
120	0.13	3.00	12.78	27.47	91.40
170	0.09	3.50	1.66	3.56	94.95
200	0.07	3.75	0.25	0.54	95.50
230	0.06	4.00	0.16	0.35	95.84
Pan			0.12	0.26	96.10
Total			44.71	96.10	96.10

Folk Statistics	phi	mm
5% :	-0.30	1.23
16% :	0.90	0.53
25% :	1.60	0.33
50% :	2.24	0.21
75% :	2.70	0.15
84% :	2.87	0.14
95% :	3.29	0.10
Med.	2.24	0.21
Mean	2.00	0.25
St Dev.	1.03	
Skew	-0.39	
Kurt.	1.33	

Cu =	1.89	Gravel		0	%
		Coarse	Sand	1	%
		Med.	Sand	18	%
Cc =	0.88	Fine	Sand	76	%

Moment Statistics	Phi	mm
Mean	2.15	0.23
St. Dev.	1.05	0.48
Skewness	-1.33	
Kurtosis	4.29	

SEA, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
7.0	-139.5	Fine sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-8
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-8-COMP

Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	4.31	8.98	8.98
	8.00	-3.00	1.18	2.46	11.44
	5.66	-2.50	0.34	0.70	12.14
5	4.00	-2.00	0.31	0.64	12.77
7	2.83	-1.50	0.63	1.32	14.09
10	2.00	-1.00	0.69	1.44	15.54
14	1.41	-0.50	1.27	2.64	18.18
18	1.00	0.00	2.41	5.03	23.21
25	0.71	0.50	2.99	6.23	29.44
35	0.50	1.00	2.09	4.36	33.79
45	0.35	1.50	2.55	5.32	39.11
60	0.25	2.00	5.31	11.07	50.18
80	0.18	2.50	9.27	19.33	69.51
120	0.13	3.00	9.84	20.52	90.03
170	0.09	3.50	1.69	3.52	93.55
200	0.07	3.75	0.33	0.69	94.24
230	0.06	4.00	0.20	0.42	94.66
Pan			0.07	0.14	94.80
Total			45.46	94.80	94.80

Folk Statistics		
	phi	mm
5% :	-3.72	13.19
16% :	-0.91	1.88
25% :	0.14	0.91
50% :	1.99	0.25
75% :	2.63	0.16
84% :	2.85	0.14
95% :	4.02	0.06
Med.	1.99	0.25
Mean	1.31	0.40
St Dev.	2.11	
Skew	-0.51	
Kurt.	1.27	

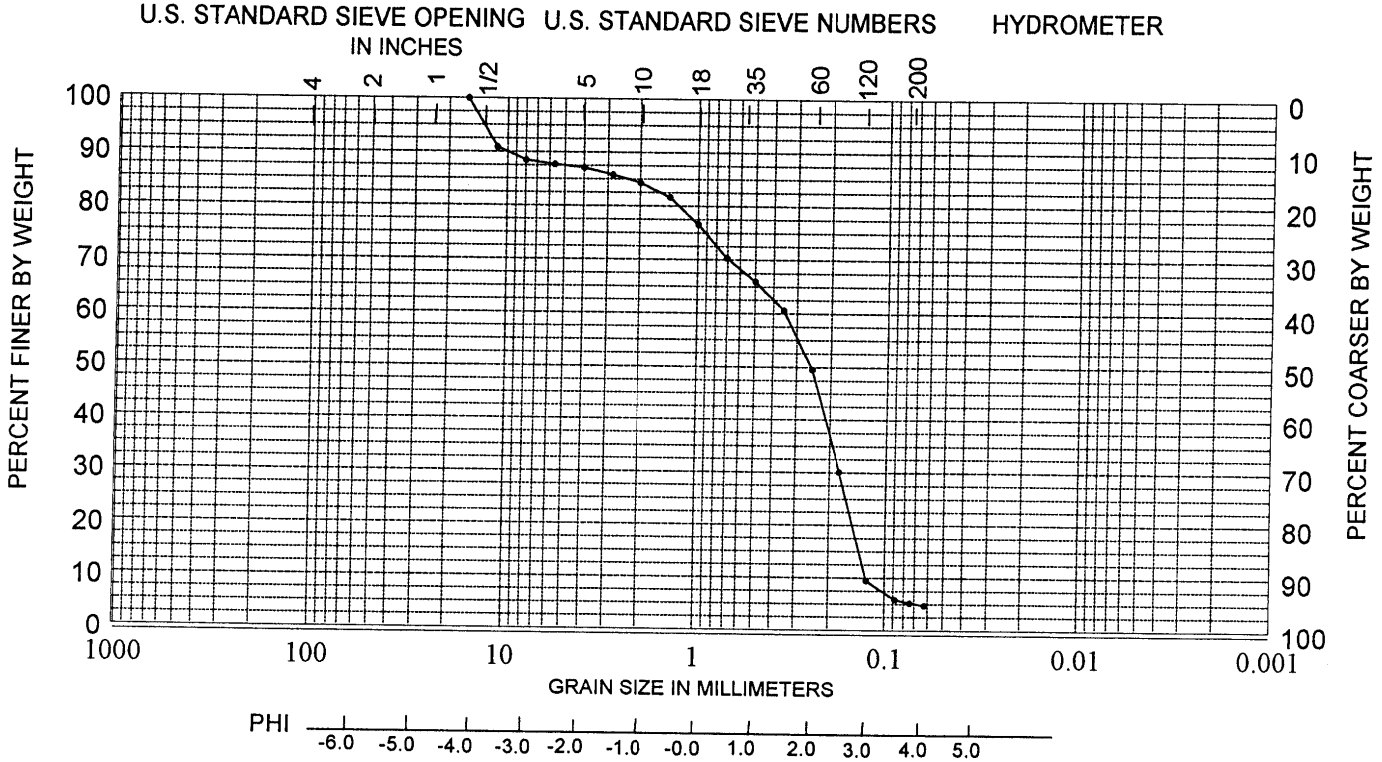
Moment Statistics		
	Phi	mm
Mean	1.19	0.44
St. Dev.	2.21	0.22
Skewness	-1.21	
Kurtosis	3.20	

Cu = 2.75

Cc = 0.71

Gravel	12	%
Coarse Sand	3	%
Med. Sand	21	%
Fine Sand	58	%

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	PROJECT Dade County Deepwater Study
COMP		Fine sand (SP)	AREA Dade Co., Florida
			BORING NO. DCV-8
			DATE March, 2000

Hole No. DCV 99-9

DRILLING LOG | DIVISION | INSTALLATION | SHEET 1 OF 1

1. PROJECT: Dade County Deepwater Geotechnical Study
2. LOCATION (Coordinates or Station): X=957768.400 Y=485174.800
3. DRILLING AGENCY: SEA, Inc./Alpine OSS
4. HOLE NO. (As shown on drawing title and file number): DCV 99-9
5. NAME OF DRILLER: Alpine OSS
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.
9. TOTAL DEPTH OF HOLE: 6.7 Ft.
10. SIZE AND TYPE OF BIT: 4" VIBRACORE
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLLW
12. MANUFACTURER'S DESIGNATION OF DRILL: PNEUMATIC VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 2 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE STARTED: 12-11-99 COMPLETED: 12-11-99
17. ELEVATION TOP OF HOLE: -130.0 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 72 %
19. SIGNATURE OF G. ZARILLO, SEA, INC

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-130.0	.0					-130.0
-130.8	.9		Light grey-pale brown medium carbonate sand. 10 YR 7/3 (SP)			
-131.6	1.6		Pale brown-white fine carbonate sand, rock fragments to 2 inches. 10 YR 8/2 (SP-GW)		1.0	
-132.2	2.2		Light grey-pale brown medium carbonate sand, shell fragments to 1/2 inch. 10 YR 7/2 (SP)	100		
			Pale brown-grey medium carbonate sand, scattered rock fragments. 10 YR 7/3 (SP)		3.0	Coral rock frags. to 3 inches, 4.4-4.7 ft
-134.8	4.8					-134.8
				0		
-136.7	6.7		Penetration depth			-136.7

Composite 0-4.5 ft.

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: Dade County Deepwater Geotechnical Study | HOLE NUMBER: DCV 99-9

Sediment Analysis Data Sheet

Sample DCV-9-1.0

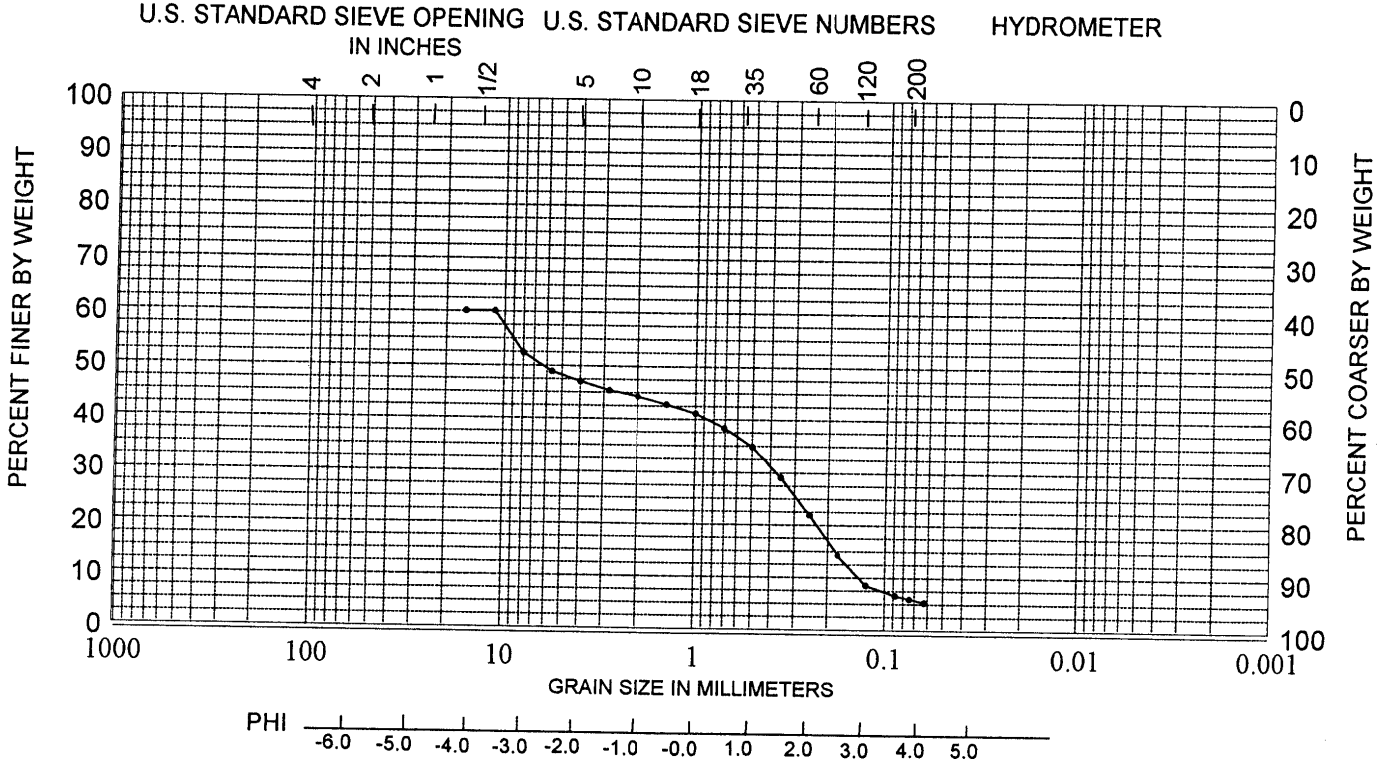
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	21.16	39.13	39.13
	11.31	-3.50	0.00	0.00	39.13
	8.00	-3.00	4.15	7.68	46.81
	5.66	-2.50	1.85	3.42	50.23
5	4.00	-2.00	0.99	1.83	52.06
7	2.83	-1.50	0.90	1.66	53.72
10	2.00	-1.00	0.61	1.12	54.84
14	1.41	-0.50	0.79	1.46	56.30
18	1.00	0.00	0.89	1.64	57.94
25	0.71	0.50	1.48	2.73	60.67
35	0.50	1.00	1.85	3.41	64.09
45	0.35	1.50	3.08	5.70	69.78
60	0.25	2.00	3.83	7.08	76.87
80	0.18	2.50	4.02	7.43	84.30
120	0.13	3.00	3.07	5.67	89.97
170	0.09	3.50	1.03	1.90	91.87
200	0.07	3.75	0.36	0.67	92.55
230	0.06	4.00	0.32	0.59	93.13
Pan			0.52	0.97	94.10
Total			50.87	94.10	94.10

Folk Statistics			
		phi	mm
5%	:	-4.80	27.86
16%	:	-4.50	22.63
25%	:	0.00	1.00
50%	:	-2.53	5.79
75%	:	1.87	0.27
84%	:	2.48	0.18
95%	:	4.05	0.06
Med.		-2.53	5.79
Mean		-1.52	2.86
St Dev.		3.09	
Skew		0.46	
Kurt.		1.94	

Cu =	87.52	Gravel		51	%
		Coarse	Sand	4	%
		Med.	Sand	12	%
Cc =	0.09	Fine	Sand	26	%

Moment Statistics		
	Phi	mm
Mean	-1.44	2.71
St. Dev.	2.95	0.13
Skewness	0.36	
Kurtosis	1.37	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	
1.0	-131.0	Well graded gravel and sand (GW)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-9
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-9-3.0

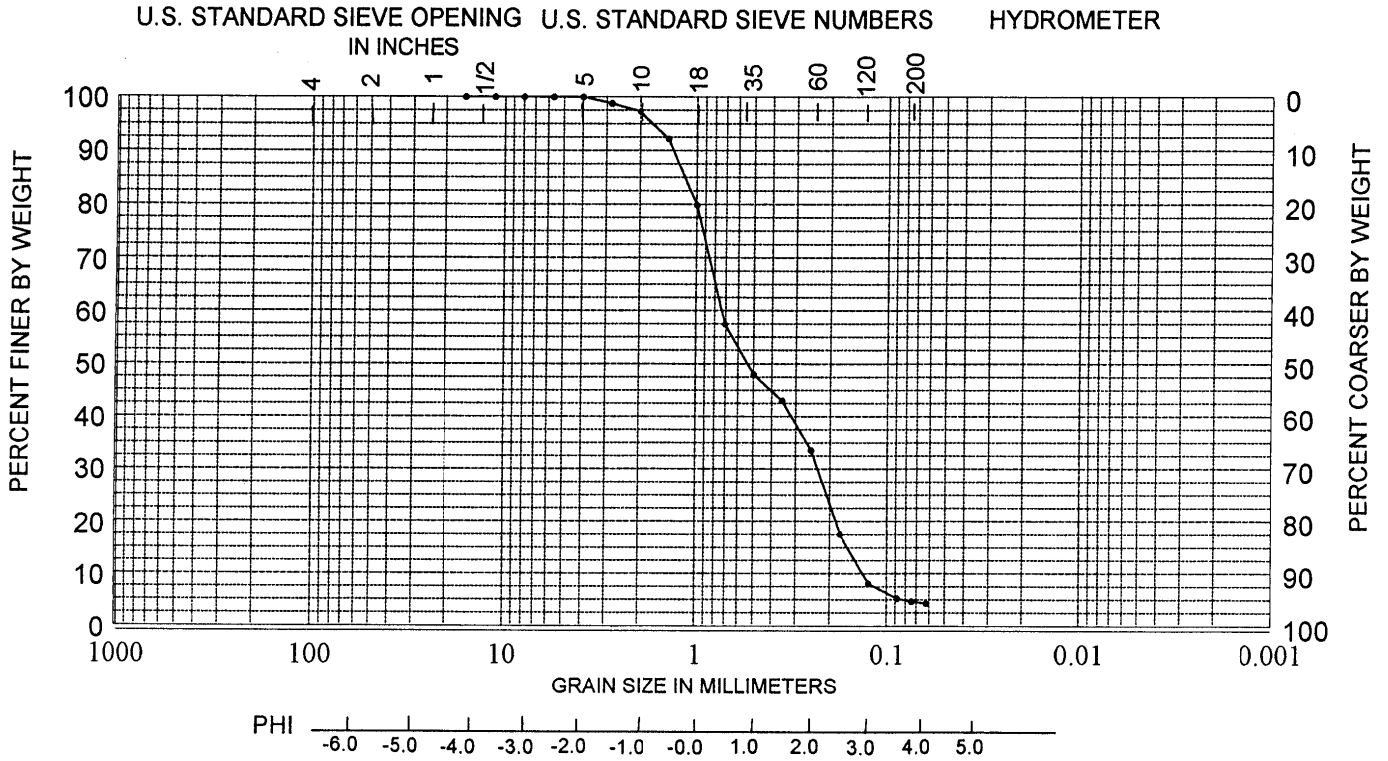
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.00	0.00	0.00
7	2.83	-1.50	0.53	1.19	1.19
10	2.00	-1.00	0.63	1.44	2.63
14	1.41	-0.50	2.24	5.06	7.69
18	1.00	0.00	5.41	12.26	19.95
25	0.71	0.50	9.80	22.19	42.15
35	0.50	1.00	4.19	9.50	51.65
45	0.35	1.50	2.17	4.92	56.57
60	0.25	2.00	4.13	9.36	65.93
80	0.18	2.50	7.00	15.87	81.79
120	0.13	3.00	4.17	9.43	91.23
170	0.09	3.50	1.25	2.83	94.06
200	0.07	3.75	0.23	0.52	94.58
230	0.06	4.00	0.18	0.41	95.00
Pan			0.09	0.20	95.20
Total			42.03	95.20	95.20

Folk Statistics		
	phi	mm
5% :	-0.77	1.70
16% :	-0.16	1.12
25% :	0.11	0.92
50% :	0.91	0.53
75% :	2.29	0.21
84% :	2.62	0.16
95% :	-0.49	1.41
Med.	0.91	0.53
Mean	1.12	0.46
St Dev.	0.74	
Skew	-5.51	
Kurt.	0.05	

Moment Statistics	Phi	mm
Mean	1.27	0.42
St. Dev.	1.26	0.42
Skewness	-0.05	
Kurtosis	2.03	

Cu =	5.59	Gravel		0	%
		Coarse	Sand	3	%
		Med.	Sand	51	%
Cc =	0.55	Fine	Sand	40	%

SEA, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
3.0	-133.0	Medium to fine sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-9
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-9-COMP

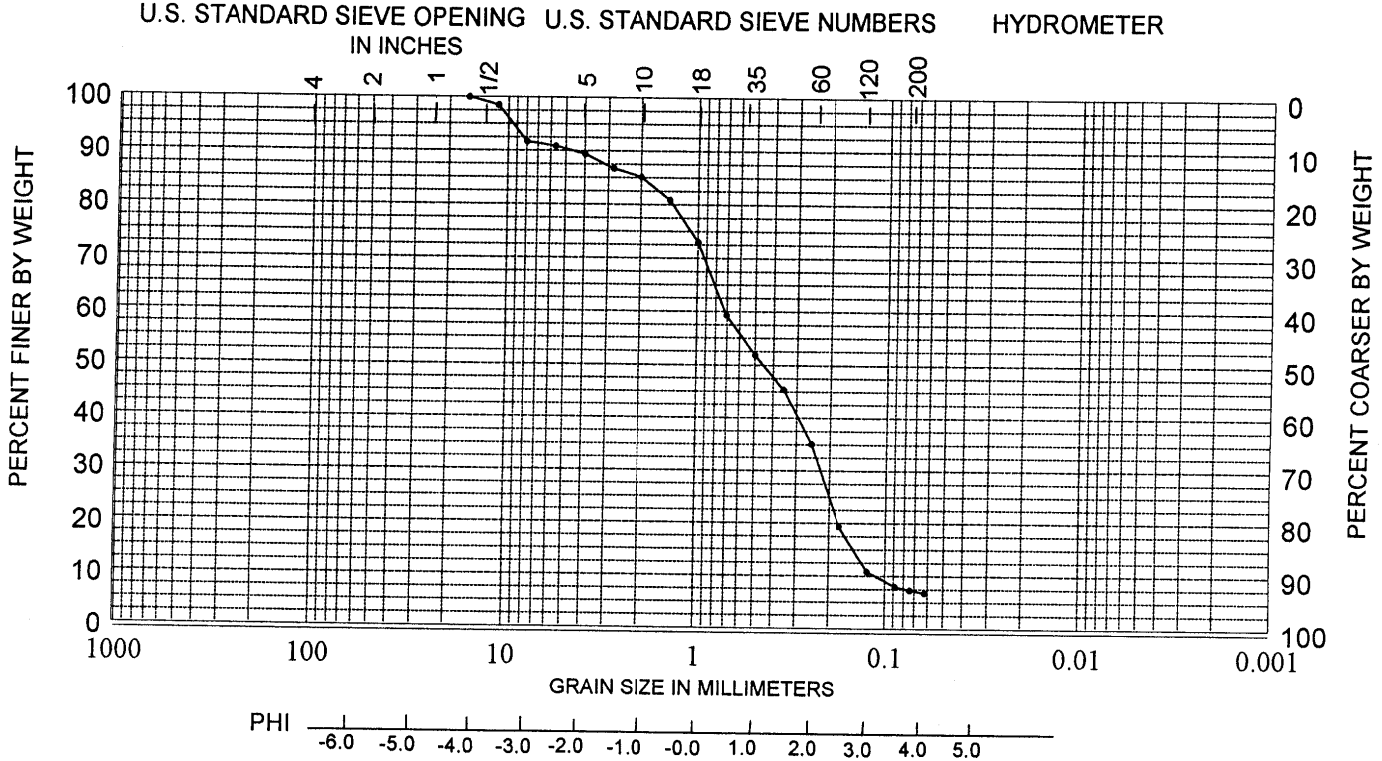
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.93	1.48	1.48
	8.00	-3.00	4.23	6.78	8.26
	5.66	-2.50	0.52	0.83	9.10
5	4.00	-2.00	0.90	1.45	10.54
7	2.83	-1.50	1.68	2.68	13.23
10	2.00	-1.00	1.00	1.60	14.83
14	1.41	-0.50	2.64	4.23	19.07
18	1.00	0.00	4.93	7.90	26.96
25	0.71	0.50	8.50	13.62	40.59
35	0.50	1.00	4.67	7.48	48.07
45	0.35	1.50	4.05	6.48	54.55
60	0.25	2.00	6.43	10.31	64.86
80	0.18	2.50	9.83	15.74	80.60
120	0.13	3.00	5.32	8.52	89.12
170	0.09	3.50	1.77	2.83	91.96
200	0.07	3.75	0.38	0.61	92.57
230	0.06	4.00	0.34	0.54	93.11
Pan			0.24	0.39	93.50
Total			58.36	93.50	93.50

Folk Statistics		phi	mm
5%	:	-3.24	9.45
16%	:	-0.86	1.82
25%	:	-0.12	1.09
50%	:	1.15	0.45
75%	:	2.32	0.20
84%	:	2.70	0.15
95%	:	4.02	0.06
Med.		1.15	0.45
Mean		1.00	0.50
St Dev.		1.99	
Skew		-0.17	
Kurt.		1.22	

Cu =	6.39				
		Gravel		10	%
		Coarse	Sand	5	%
		Med.	Sand	36	%
Cc =	0.62	Fine	Sand	41	%

Moment Statistics	Phi	mm
Mean	0.87	0.55
St. Dev.	1.91	0.27
Skewness	-0.84	
Kurtosis	2.85	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	PROJECT Dade County Deepwater Study
COMP		Medium to fine sand (SP)	AREA Dade Co., Florida
			BORING NO. DCV-9
			DATE March, 2000

Hole No.DCV 99-10

DRILLING LOG | DIVISION | INSTALLATION | SHEET 1 OF 1

1. PROJECT: Dade County Deepwater Geotechnical Study
2. LOCATION (Coordinates or Station): X=955774.600 Y=476928.100
3. DRILLING AGENCY: SEA, Inc./Alpine OSS
4. HOLE NO. (As shown on drawing title and file number): DCV 99-10
5. NAME OF DRILLER: Alpine OSS
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.
9. TOTAL DEPTH OF HOLE: 19.7 Ft.
10. SIZE AND TYPE OF BIT: 4" VIBRACORE
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLLW
12. MANUFACTURER'S DESIGNATION OF DRILL: PNEUMATIC VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 4 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE STARTED: 12-8-99 COMPLETED: 12-8-99
17. ELEVATION TOP OF HOLE: -53.0 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 92 %
19. SIGNATURE OF G. ZARILLO, SEA,INC

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-53.0	.0					-53.0
			Very pale brown to white medium to fine carbonate sand, large shell fragments to 1 inch. 10 YR 8/2 (SP)	100	0.5 2.0	
						-58.0
				100	7.0	
-61.4	8.4					
-62.2	9.2		Light grey medium to fine carbonate sand, small shell fragments. 10 YR 8/2 (SP)			
			Fine carbonate sand, large shell fragments to 2 inches. 10 YR 8/2 (SP)			-63.0
				100	12.0	
-67.2	14.2					
			Medium to fine carbonate sand, mud fraction. 10 YR 8/2 (SM)			Scattered shell frags to 1 inch, 12.0 ft
-68.5	15.5					-68.0
			White to very pale brown carbonate sand, some mud. 10 YR 8/1-8/2 (SP)	100		
-71.2	18.2					-71.2
				0		
-72.7	19.7					-72.7
			Penetration depth			
						Composite 0-18.2 ft.

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

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PROJECT	HOLE NUMBER
Dade County Deepwater Geotechnical Study	DCV 99-10

Sediment Analysis Data Sheet

Sample DCV-10-0.5

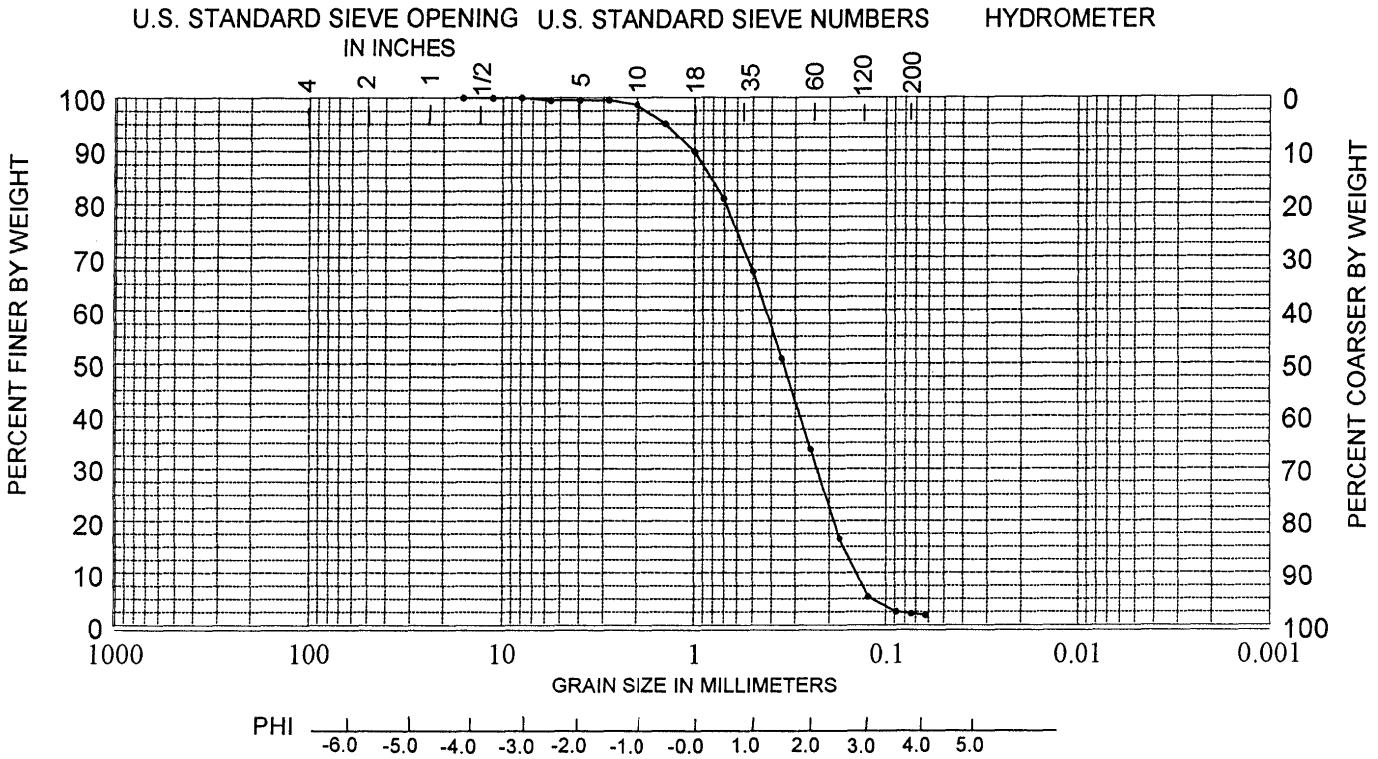
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.16	0.47	0.47
5	4.00	-2.00	0.00	0.00	0.47
7	2.83	-1.50	0.00	0.00	0.47
10	2.00	-1.00	0.27	0.80	1.27
14	1.41	-0.50	1.25	3.64	4.91
18	1.00	0.00	1.77	5.14	10.06
25	0.71	0.50	3.00	8.74	18.80
35	0.50	1.00	4.71	13.71	32.50
45	0.35	1.50	5.61	16.32	48.82
60	0.25	2.00	5.90	17.17	65.99
80	0.18	2.50	5.83	16.98	82.97
120	0.13	3.00	3.84	11.18	94.16
170	0.09	3.50	1.00	2.90	97.06
200	0.07	3.75	0.12	0.34	97.40
230	0.06	4.00	0.09	0.26	97.66
Pan			0.05	0.14	97.80
Total			33.60	97.80	97.80

Folk Statistics	phi	mm
5% :	-0.49	1.41
16% :	0.34	0.79
25% :	0.73	0.60
50% :	1.53	0.35
75% :	2.27	0.21
84% :	2.55	0.17
95% :	3.15	0.11
Med.	1.53	0.35
Mean	1.47	0.36
St Dev.	1.10	
Skew	-0.10	
Kurt.	0.97	

Cu =	3.00	Gravel		0	%	
		Coarse	Sand	1	%	
		Med.	Sand	39	%	
Cc =	0.88	Fine	Sand	57	%	

Moment Statistics	Phi	mm
Mean	1.64	0.32
St. Dev.	1.09	0.47
Skewness	-0.68	
Kurtosis	3.58	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	PROJECT Dade County Deepwater Study
0.5	-53.5	Medium to fine sand (SP)	AREA Dade Co., Florida
			BORING NO. DCV-10
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-10-2.0

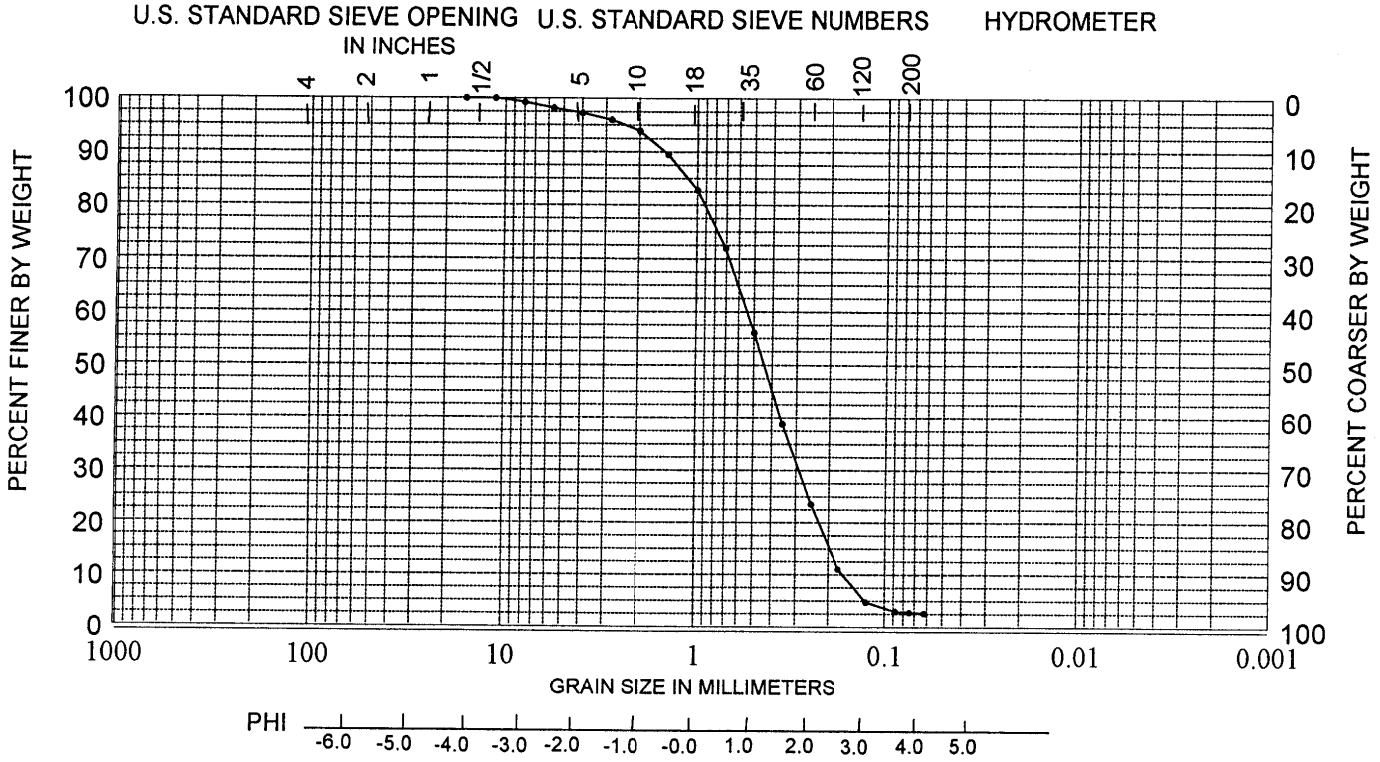
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.39	0.74	0.74
	5.66	-2.50	0.54	1.04	1.78
5	4.00	-2.00	0.46	0.87	2.65
7	2.83	-1.50	0.68	1.29	3.94
10	2.00	-1.00	1.07	2.03	5.97
14	1.41	-0.50	2.34	4.45	10.42
18	1.00	0.00	3.47	6.60	17.02
25	0.71	0.50	5.65	10.76	27.78
35	0.50	1.00	8.35	15.89	43.67
45	0.35	1.50	9.06	17.25	60.92
60	0.25	2.00	7.95	15.14	76.05
80	0.18	2.50	6.54	12.45	88.51
120	0.13	3.00	3.30	6.29	94.79
170	0.09	3.50	0.91	1.73	96.52
200	0.07	3.75	0.10	0.19	96.71
230	0.06	4.00	0.13	0.25	96.96
Pan			0.08	0.14	97.10
Total			51.01	97.10	97.10

Folk Statistics		
	phi	mm
5% :	-1.24	2.36
16% :	-0.08	1.06
25% :	0.37	0.77
50% :	1.18	0.44
75% :	1.97	0.26
84% :	2.32	0.20
95% :	3.06	0.12
Med.	1.18	0.44
Mean	1.14	0.45
St Dev.	1.25	
Skew	-0.09	
Kurt.	1.10	

Moment Statistics		
	Phi	mm
Mean	1.23	0.43
St. Dev.	1.29	0.41
Skewness	-0.94	
Kurtosis	4.11	

Cu =	3.33	Gravel		2	%
		Coarse	Sand	4	%
		Med.	Sand	46	%
Cc =	0.94	Fine	Sand	44	%

SEA, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
2.0	-55.0	Medium to fine sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-10
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-10-7.0

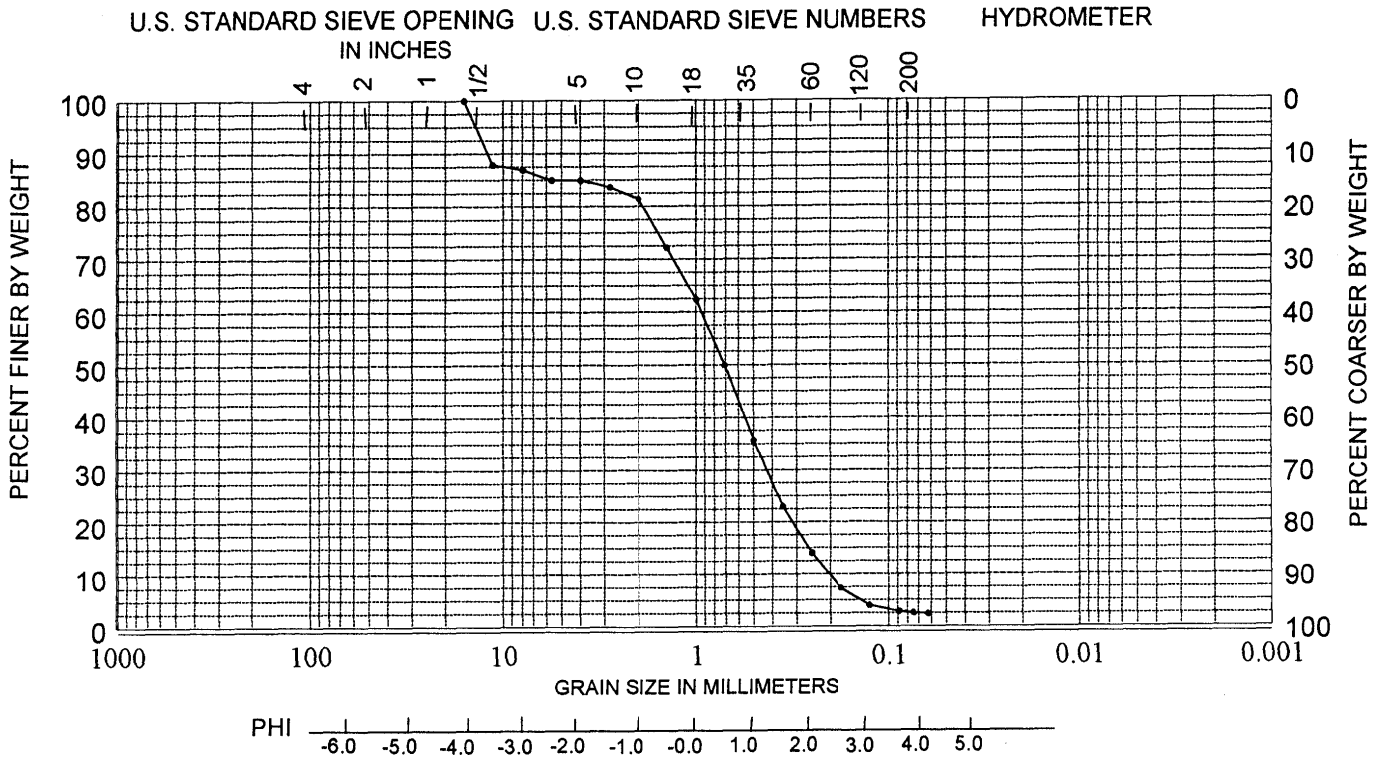
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	5.97	12.03	12.03
	8.00	-3.00	0.47	0.95	12.97
	5.66	-2.50	0.98	1.97	14.94
5	4.00	-2.00	0.00	0.00	14.94
7	2.83	-1.50	0.62	1.26	16.20
10	2.00	-1.00	1.14	2.29	18.49
14	1.41	-0.50	4.56	9.19	27.68
18	1.00	0.00	4.84	9.74	37.42
25	0.71	0.50	6.21	12.51	49.94
35	0.50	1.00	7.01	14.13	64.07
45	0.35	1.50	6.28	12.66	76.73
60	0.25	2.00	4.46	8.98	85.71
80	0.18	2.50	3.27	6.59	92.30
120	0.13	3.00	1.70	3.43	95.74
170	0.09	3.50	0.55	1.11	96.85
200	0.07	3.75	0.13	0.25	97.10
230	0.06	4.00	0.08	0.16	97.26
Pan			0.07	0.14	97.40
Total			48.33	97.40	97.40

Folk Statistics		phi	mm
5%	:	-3.79	13.85
16%	:	-1.58	2.99
25%	:	-0.65	1.56
50%	:	0.50	0.71
75%	:	1.43	0.37
84%	:	1.90	0.27
95%	:	2.89	0.13
Med.		0.50	0.71
Mean		0.28	0.83
St Dev.		1.88	
Skew		-0.24	
Kurt.		1.32	

Cu =	4.67	Gravel		15	%
		Coarse	Sand	4	%
		Med.	Sand	52	%
Cc =	0.97	Fine	Sand	27	%

Moment Statistics	Phi	mm
Mean	0.25	0.84
St. Dev.	1.96	0.26
Skewness	-0.84	
Kurtosis	2.83	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	
7.0	-60.0	Medium sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-10
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-10-12.0

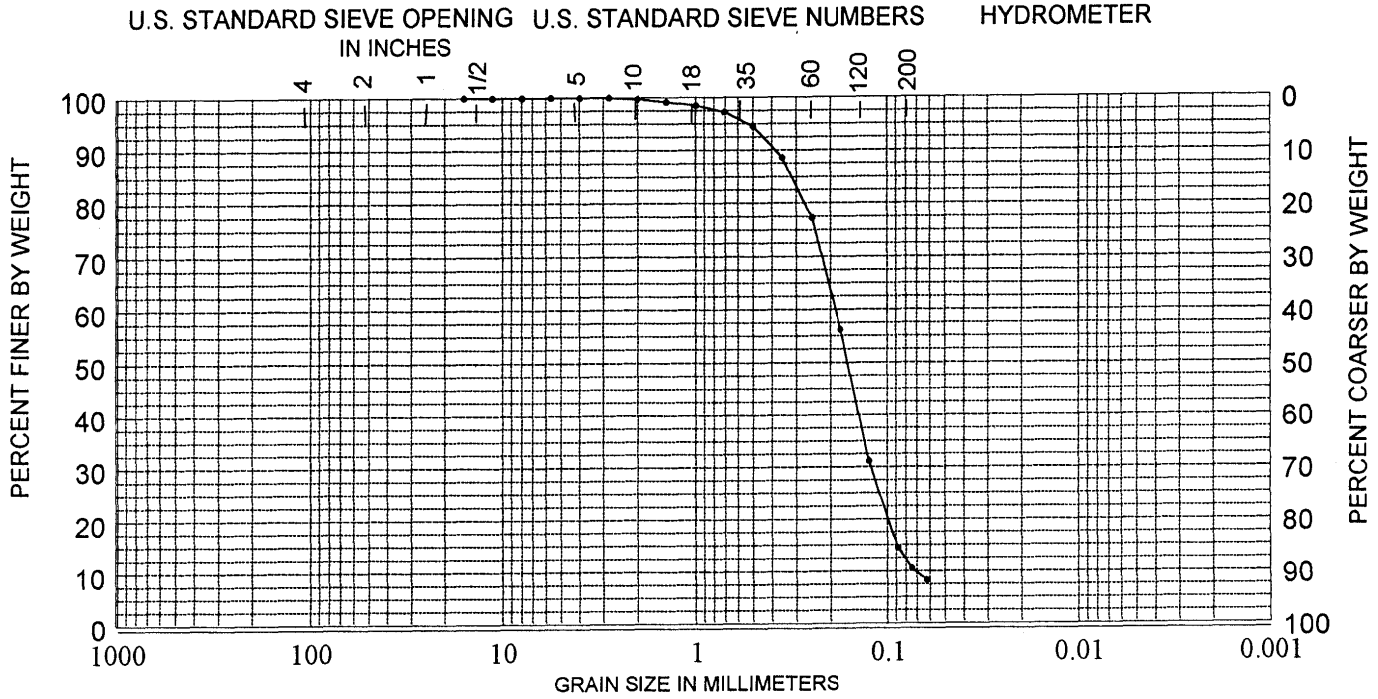
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.00	0.00	0.00
7	2.83	-1.50	0.01	0.02	0.02
10	2.00	-1.00	0.12	0.25	0.27
14	1.41	-0.50	0.23	0.48	0.75
18	1.00	0.00	0.31	0.64	1.39
25	0.71	0.50	0.58	1.19	2.59
35	0.50	1.00	1.27	2.62	5.21
45	0.35	1.50	2.73	5.66	10.86
60	0.25	2.00	5.20	10.77	21.64
80	0.18	2.50	9.65	19.99	41.63
120	0.13	3.00	11.57	23.97	65.60
170	0.09	3.50	7.64	15.82	81.42
200	0.07	3.75	1.79	3.71	85.13
230	0.06	4.00	1.08	2.23	87.36
Pan			0.94	1.94	89.30
Total			43.11	89.30	89.30

Folk Statistics	phi	mm
5% :	0.96	0.51
16% :	1.74	0.30
25% :	2.08	0.24
50% :	2.67	0.16
75% :	3.30	0.10
84% :	3.60	0.08
95% :	4.50	0.04
Med.	2.67	0.16
Mean	2.67	0.16
St Dev.	1.00	
Skew	0.01	
Kurt.	1.20	

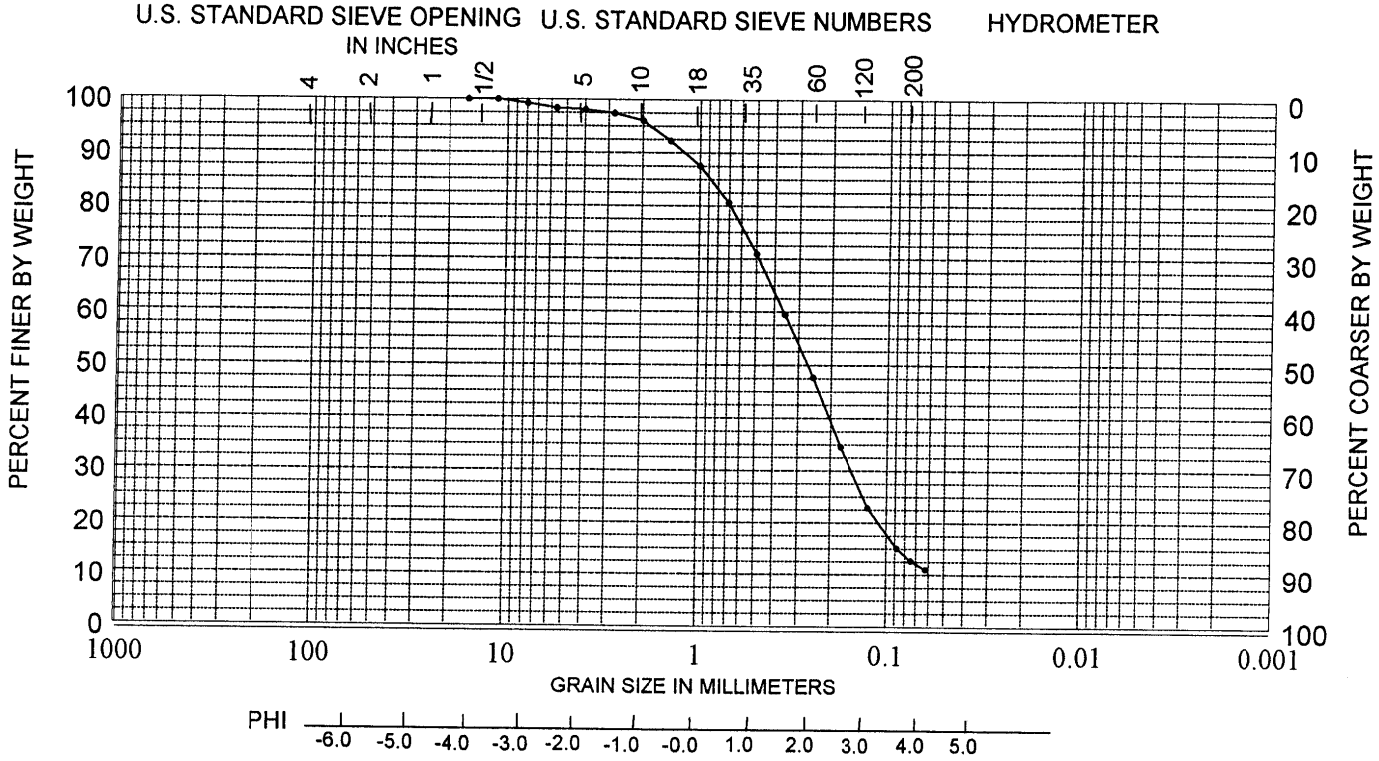
Cu =	0.18	Gravel		0	%
		Coarse	Sand	0	%
		Med.	Sand	8	%
Cc =	0.07	Fine	Sand	77	%

Moment Statistics	Phi	mm
Mean	2.61	0.16
St. Dev.	0.84	0.56
Skewness	-1.13	
Kurtosis	5.03	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	
12.0	-65.0	Fine muddy sand (SM)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-10
			DATE March, 2000



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
COMP		Medium to fine muddy sand (SM)	

PROJECT	Dade County Deepwater Study
AREA	Dade Co., Florida
BORING NO.	DCV-10
DATE	March, 2000

Sediment Analysis Data Sheet

Sample DCV-10-COMP

Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.43	0.73	0.73
	5.66	-2.50	0.46	0.77	1.50
5	4.00	-2.00	0.16	0.26	1.76
7	2.83	-1.50	0.41	0.68	2.44
10	2.00	-1.00	0.79	1.32	3.76
14	1.41	-0.50	2.21	3.72	7.48
18	1.00	0.00	2.72	4.58	12.07
25	0.71	0.50	3.95	6.64	18.70
35	0.50	1.00	5.65	9.50	28.20
45	0.35	1.50	6.64	11.16	39.37
60	0.25	2.00	6.81	11.46	50.82
80	0.18	2.50	7.60	12.79	63.61
120	0.13	3.00	6.75	11.35	74.96
170	0.09	3.50	4.50	7.57	82.52
200	0.07	3.75	1.38	2.33	84.85
230	0.06	4.00	1.00	1.69	86.54
Pan			0.33	0.56	87.10
Total			51.78	87.10	87.10

Folk Statistics		
	phi	mm
5% :	-0.83	1.78
16% :	0.30	0.81
25% :	0.83	0.56
50% :	1.96	0.26
75% :	3.00	0.12
84% :	3.57	0.08
95% :	4.80	0.04
Med.	1.96	0.26
Mean	1.94	0.26
St Dev.	1.67	
Skew	-0.01	
Kurt.	1.06	

Cu =	0.35	Gravel		2	%
		Coarse	Sand	2	%
		Med.	Sand	30	%
Cc =	0.06	Fine	Sand	51	%

Moment Statistics	Phi	mm
Mean	1.72	0.30
St. Dev.	1.43	0.37
Skewness	-0.94	
Kurtosis	3.73	

SEA, INC.

Hole No. DCV 99-15

DRILLING LOG | DIVISION | INSTALLATION | SHEET 1 OF 1

1. PROJECT: Dade County Deepwater Geotechnical Study
2. LOCATION (Coordinates or Station): X=958077.400 Y=529940.500
3. DRILLING AGENCY: SEA, Inc./Alpine OSS
4. HOLE NO. (As shown on drawing title and file number): DCV 99-15
5. NAME OF DRILLER: Alpine OSS
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.
9. TOTAL DEPTH OF HOLE: 9.6 Ft.
10. SIZE AND TYPE OF BIT: 4" VIBRACORE
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLLW
12. MANUFACTURER'S DESIGNATION OF DRILL: PNEUMATIC VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 2 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE STARTED: 12-12-99 COMPLETED: 12-12-99
17. ELEVATION TOP OF HOLE: -127.4 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 78 %
19. SIGNATURE OF G. ZARILLO, SEA, INC

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-127.4	.0					-127.4
			White to very light grey semi-lithified medium carbonate sand. 10 YR 8/1 (SP-GW)	100	1.0	Large coral pieces, 2.6-2.8 ft.
-131.7	4.3					Large coral pieces, 3.2-3.5 ft.
			Pale brown-white medium to fine sand. 10 YR 8/2 (SP)		5.0	-132.4
				100		Partial void/gas pocket 5.0-7.5 ft.
-135.3	7.9					-134.8
				0		Large piece of coral at end.
-137.0	9.6					-137.0
			Penetration depth			

Composite 1, 0-2.5 ft.

Composite 2, 5.0-7.5 ft.

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1838 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: Dade County Deepwater Geotechnical Study | HOLE NUMBER: DCV 99-15

Sediment Analysis Data Sheet

Sample DCV-15-1.0

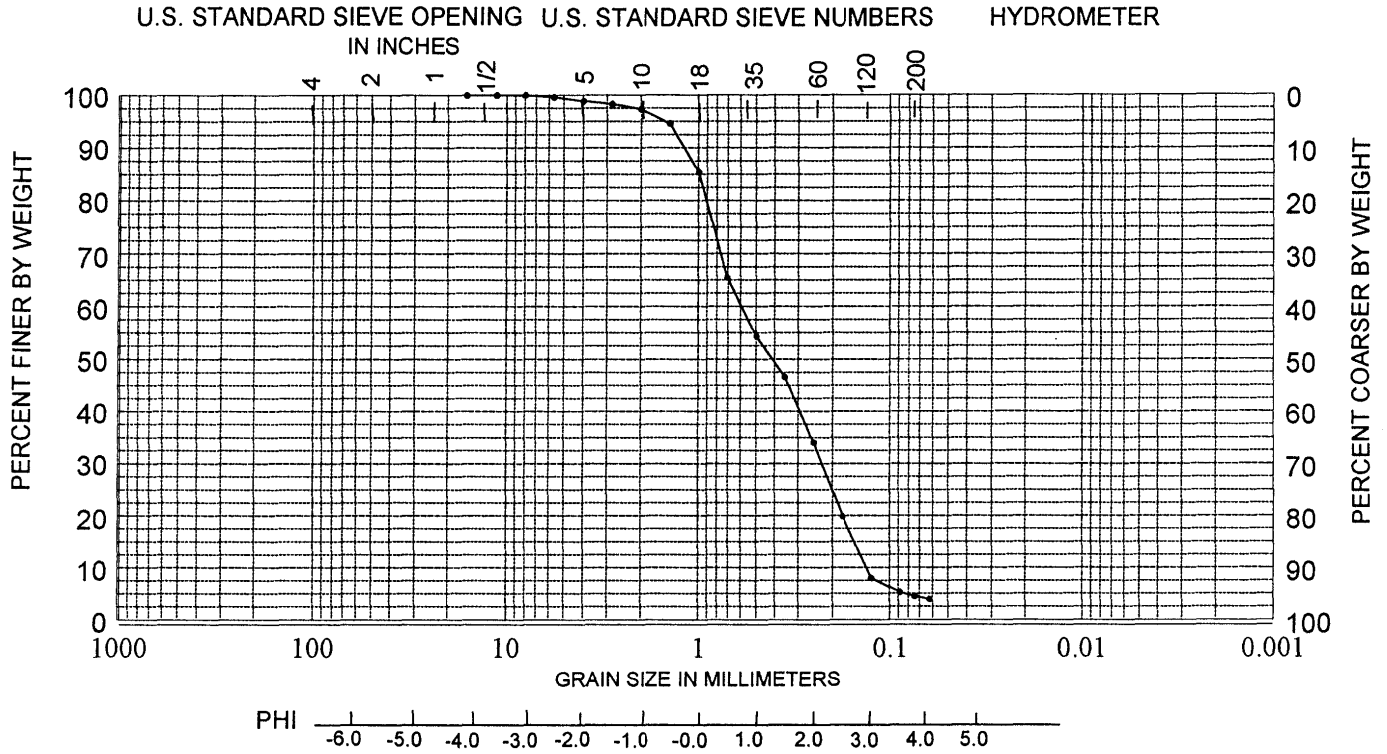
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.20	0.34	0.34
5	4.00	-2.00	0.48	0.81	1.15
7	2.83	-1.50	0.31	0.52	1.68
10	2.00	-1.00	0.56	0.95	2.63
14	1.41	-0.50	1.60	2.71	5.33
18	1.00	0.00	5.45	9.22	14.56
25	0.71	0.50	11.74	19.87	34.43
35	0.50	1.00	6.58	11.13	45.56
45	0.35	1.50	4.60	7.79	53.35
60	0.25	2.00	7.42	12.57	65.91
80	0.18	2.50	8.41	14.24	80.15
120	0.13	3.00	6.95	11.76	91.92
170	0.09	3.50	1.68	2.84	94.76
200	0.07	3.75	0.42	0.71	95.47
230	0.06	4.00	0.30	0.51	95.99
Pan			0.30	0.51	96.50
Total			56.99	96.50	96.50

Folk Statistics		phi	mm
5%	:	-0.56	1.48
16%	:	0.04	0.98
25%	:	0.26	0.83
50%	:	1.28	0.41
75%	:	2.32	0.20
84%	:	2.66	0.16
95%	:	3.42	0.09
Med.		1.28	0.41
Mean		1.33	0.40
St Dev.		1.26	
Skew		0.06	
Kurt.		0.79	

Cu =	4.49				
		Gravel		1	%
		Coarse	Sand	2	%
		Med.	Sand	47	%
Cc =	0.65	Fine	Sand	46	%

Moment Statistics	Phi	mm
Mean	1.41	0.38
St. Dev.	1.24	0.42
Skewness	-0.36	
Kurtosis	2.75	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	
1.0	-128.4	Medium to fine sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-15
			DATE March, 2000

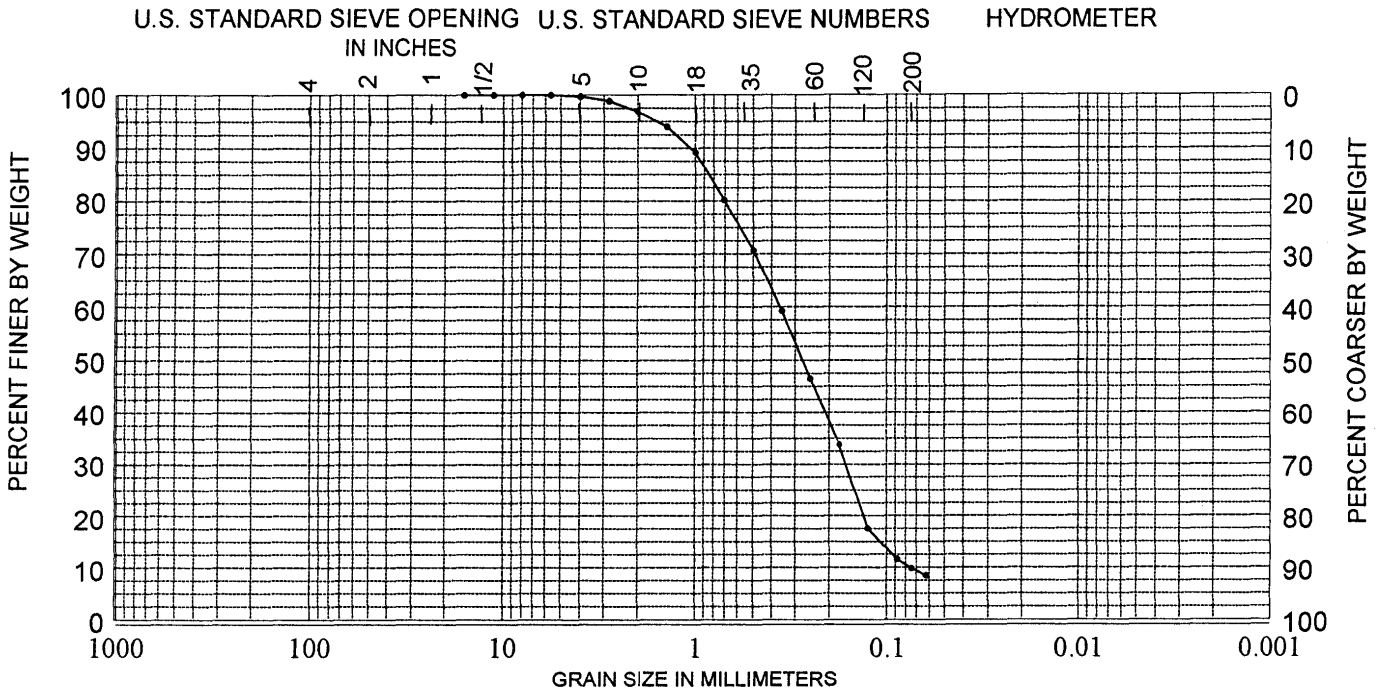
Sediment Analysis Data Sheet

Sample DCV-15-5.0

Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %	Folk Statistics	phi	mm
	16.00	-4.00	0.00	0.00	0.00			
	11.31	-3.50	0.00	0.00	0.00			
	8.00	-3.00	0.00	0.00	0.00			
	5.66	-2.50	0.00	0.00	0.00	5% :	-0.63	1.55
5	4.00	-2.00	0.18	0.29	0.29	16% :	0.32	0.80
7	2.83	-1.50	0.48	0.76	1.05	25% :	0.82	0.57
10	2.00	-1.00	1.18	1.87	2.93	50% :	1.92	0.26
14	1.41	-0.50	1.77	2.81	5.73	75% :	2.84	0.14
18	1.00	0.00	2.95	4.67	10.41	84% :	3.34	0.10
25	0.71	0.50	5.53	8.76	19.17	95% :	4.60	0.04
35	0.50	1.00	5.83	9.24	28.41			
45	0.35	1.50	6.99	11.07	39.48	Med.	1.92	0.26
60	0.25	2.00	7.85	12.43	51.91	Mean	1.86	0.28
80	0.18	2.50	7.79	12.34	64.25	St Dev.	1.55	
120	0.13	3.00	9.97	15.79	80.04	Skew	-0.02	
170	0.09	3.50	3.64	5.76	85.80	Kurt.	1.06	
200	0.07	3.75	1.09	1.72	87.52			
230	0.06	4.00	0.82	1.30	88.81			
Pan			0.81	1.29	90.10			
Total			56.89	90.10	90.10			

							Moment	Statistics	
								Phi	mm
Cu =	0.34		Gravel		0	%	Mean	1.76	0.30
			Coarse	Sand	3	%	St. Dev.	1.27	0.41
			Med.	Sand	31	%	Skewness	-0.62	
Cc =	0.07		Fine	Sand	54	%	Kurtosis	2.75	

SEA, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
5.0	-132.4	Medium to fine sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-15
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-15-COMP 1

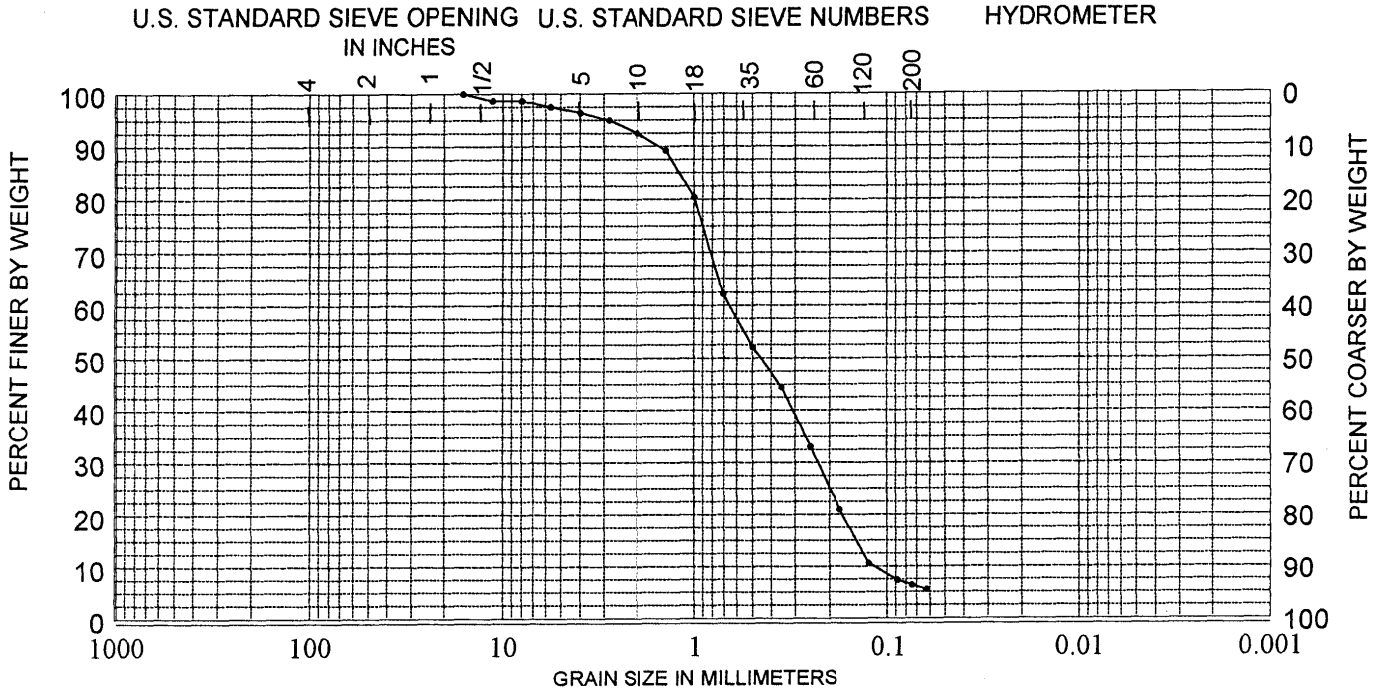
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.92	1.25	1.25
	8.00	-3.00	0.00	0.00	1.25
	5.66	-2.50	0.81	1.10	2.35
5	4.00	-2.00	0.83	1.12	3.47
7	2.83	-1.50	1.06	1.44	4.91
10	2.00	-1.00	1.67	2.27	7.18
14	1.41	-0.50	2.41	3.27	10.45
18	1.00	0.00	6.32	8.58	19.02
25	0.71	0.50	13.13	17.83	36.85
35	0.50	1.00	7.25	9.85	46.70
45	0.35	1.50	5.54	7.52	54.22
60	0.25	2.00	8.13	11.04	65.26
80	0.18	2.50	8.72	11.84	77.10
120	0.13	3.00	7.47	10.14	87.24
170	0.09	3.50	2.32	3.14	90.39
200	0.07	3.75	0.74	1.00	91.39
230	0.06	4.00	0.58	0.79	92.18
Pan			1.12	1.52	93.70
Total			69.01	93.70	93.70

Folk Statistics			
		phi	mm
5%	:	-1.48	2.79
16%	:	-0.18	1.13
25%	:	0.17	0.89
50%	:	1.22	0.43
75%	:	2.41	0.19
84%	:	2.84	0.14
95%	:	4.05	0.06
Med.		1.22	0.43
Mean		1.29	0.41
St Dev.		1.59	
Skew		0.05	
Kurt.		1.01	

Cu =	6.86	Gravel		3	%
		Coarse	Sand	4	%
		Med.	Sand	43	%
Cc =	0.81	Fine	Sand	41	%

Moment Statistics		
	Phi	mm
Mean	1.20	0.44
St. Dev.	1.50	0.35
Skewness	-0.73	
Kurtosis	3.59	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	
COMP 1		Medium to fine well graded sand (SW)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCV-15
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCV-15-COMP 2

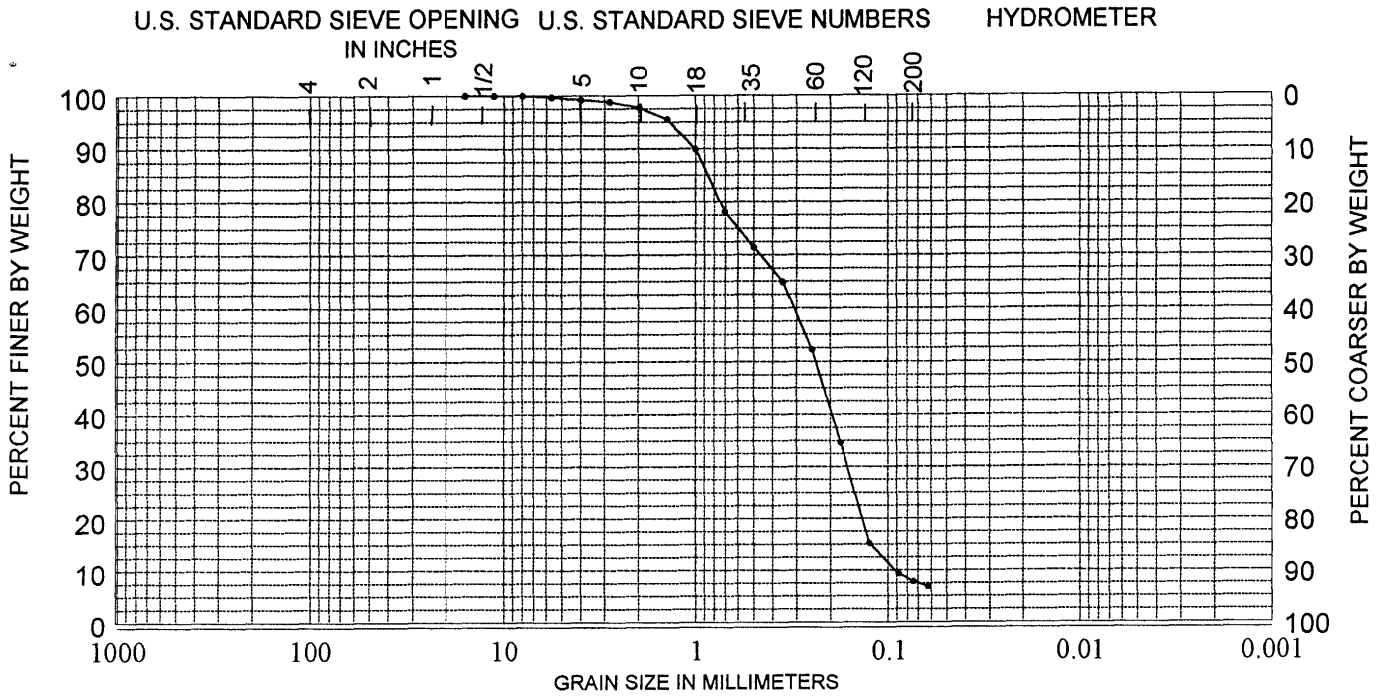
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.15	0.23	0.23
5	4.00	-2.00	0.30	0.48	0.71
7	2.83	-1.50	0.23	0.37	1.08
10	2.00	-1.00	0.69	1.10	2.18
14	1.41	-0.50	1.39	2.21	4.39
18	1.00	0.00	3.48	5.53	9.92
25	0.71	0.50	7.15	11.36	21.28
35	0.50	1.00	4.21	6.69	27.97
45	0.35	1.50	4.04	6.43	34.40
60	0.25	2.00	7.79	12.39	46.78
80	0.18	2.50	10.85	17.24	64.03
120	0.13	3.00	11.98	19.05	83.07
170	0.09	3.50	3.70	5.88	88.95
200	0.07	3.75	0.88	1.39	90.35
230	0.06	4.00	0.57	0.91	91.26
Pan			0.53	0.84	92.10
Total			57.93	92.10	92.10

Folk Statistics	phi	mm
5% :	-0.44	1.36
16% :	0.27	0.83
25% :	0.78	0.58
50% :	2.09	0.23
75% :	2.79	0.14
84% :	3.08	0.12
95% :	4.07	0.06
Med.	2.09	0.23
Mean	1.81	0.28
St Dev.	1.39	
Skew	-0.21	
Kurt.	0.92	

Cu =	3.73	Gravel		0	%	
		Coarse	Sand	2	%	
		Med.	Sand	29	%	
Cc =	1.03	Fine	Sand	59	%	

Moment Statistics	Phi	mm
Mean	1.86	0.28
St. Dev.	1.26	0.42
Skewness	-0.79	
Kurtosis	3.06	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	PROJECT Dade County Deepwater Study
COMP 2		Medium to fine fine sand (SP)	AREA Dade Co., Florida
			BORING NO. DCV-15
			DATE March, 2000

Hole No. DCG 99-18R2

DRILLING LOG | DIVISION | INSTALLATION | SHEET 1 OF 1

1. PROJECT
Dade County Deepwater Geotechnical Study

2. LOCATION (Coordinates or Station)
X=959883.900 Y=562443.100

3. DRILLING AGENCY
SEA, Inc./Alpine OSS

4. HOLE NO. (As shown on drawing title and file number)
DCG 99-18R2

5. NAME OF DRILLER
Alpine OSS

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED

7. THICKNESS OF BURDEN 0 Ft.

8. DEPTH DRILLED INTO ROCK 0 Ft.

9. TOTAL DEPTH OF HOLE 3.4 Ft.

10. SIZE AND TYPE OF BIT 4" Gravity Core

11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
MLLW

12. MANUFACTURER'S DESIGNATION OF DRILL
Alpine Gravity Core

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN
disturbed: 1 undisturbed: 0

14. TOTAL NUMBER OF CORE BOXES

15. ELEVATION GROUND WATER

16. DATE HOLE STARTED COMPLETED
12-14-99 12-14-99

17. ELEVATION TOP OF HOLE -275.4 Ft.

18. TOTAL CORE RECOVERY FOR BORING %

19. SIGNATURE OF G. ZARILLO, SEA,INC

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-275.4	.0					-275.4
			Pale brown medium to fine carbonate sand, trace mud. 10 YR 8/2 (SP)	100	1.0	
-278.8	3.4					-278.8

Composite 0-3.4 ft.

0
2.5
5
7.5
10
12.5
15
17.5
20
22.5

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT	HOLE NUMBER
Dade County Deepwater Geotechnical Study	DCG 99-18R2

Sediment Analysis Data Sheet

Sample DCG-18R2-1.0

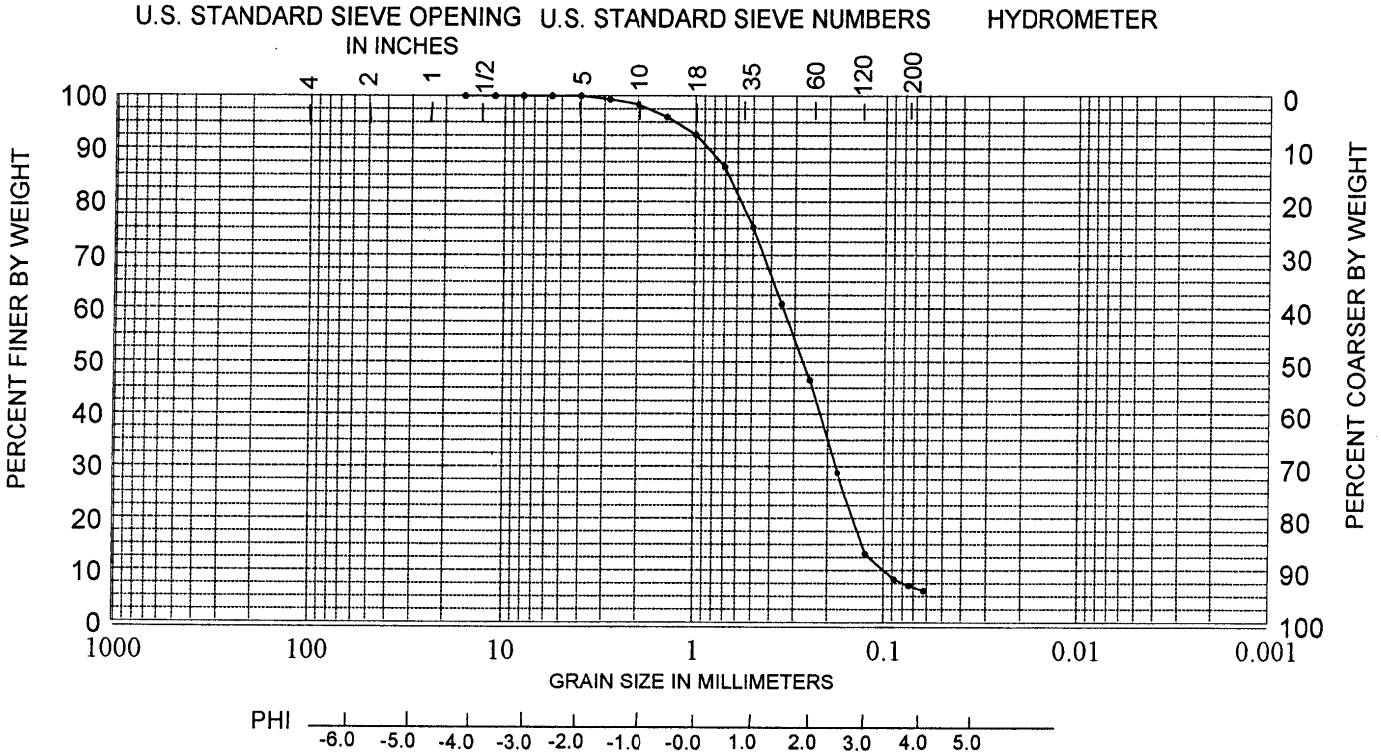
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.00	0.00	0.00
5	4.00	-2.00	0.00	0.00	0.00
7	2.83	-1.50	0.24	0.62	0.62
10	2.00	-1.00	0.36	0.94	1.57
14	1.41	-0.50	0.90	2.33	3.90
18	1.00	0.00	1.25	3.24	7.14
25	0.71	0.50	2.30	5.95	13.10
35	0.50	1.00	4.27	11.07	24.17
45	0.35	1.50	5.43	14.06	38.22
60	0.25	2.00	5.46	14.15	52.37
80	0.18	2.50	6.69	17.34	69.71
120	0.13	3.00	5.91	15.30	85.02
170	0.09	3.50	1.85	4.80	89.82
200	0.07	3.75	0.46	1.18	91.00
230	0.06	4.00	0.40	1.03	92.03
Pan			0.34	0.87	92.90
Total			35.85	92.90	92.90

Folk Statistics		phi	mm
5%	:	-0.33	1.26
16%	:	0.63	0.65
25%	:	1.03	0.49
50%	:	1.92	0.26
75%	:	2.67	0.16
84%	:	2.97	0.13
95%	:	4.08	0.06
Med.		1.92	0.26
Mean		1.84	0.28
St Dev.		1.25	
Skew		-0.06	
Kurt.		1.10	

Cu =	3.40	Gravel		0	%
		Coarse	Sand	2	%
		Med.	Sand	30	%
Cc =	0.91	Fine	Sand	60	%

Moment Statistics	Phi	mm
Mean	1.87	0.27
St. Dev.	1.11	0.46
Skewness	-0.71	
Kurtosis	3.20	

SEA, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
1.0	-276.4	Medium to fine sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCG-18R2
			DATE March, 2000

Sediment Analysis Data Sheet

Sample DCG-18R2-COMP

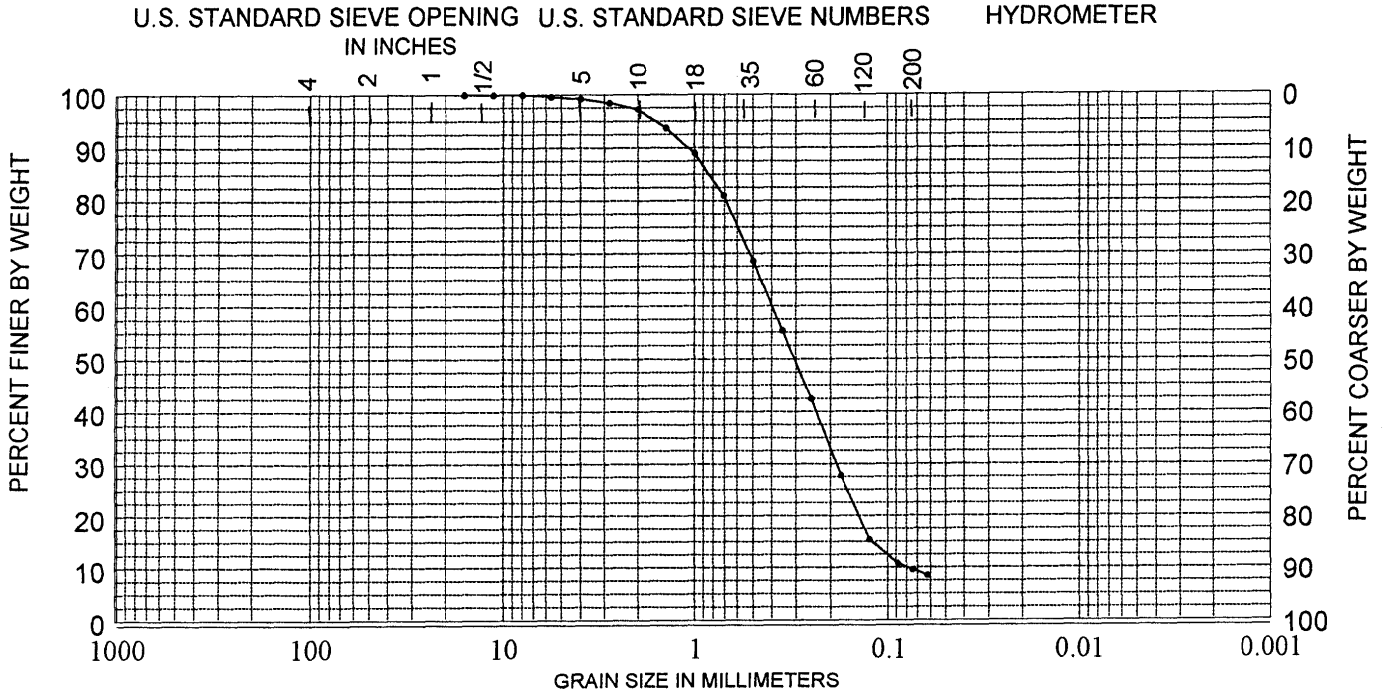
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.28	0.41	0.41
5	4.00	-2.00	0.25	0.36	0.78
7	2.83	-1.50	0.46	0.68	1.45
10	2.00	-1.00	0.90	1.32	2.77
14	1.41	-0.50	2.33	3.43	6.21
18	1.00	0.00	3.27	4.81	11.01
25	0.71	0.50	5.43	8.00	19.01
35	0.50	1.00	8.37	12.31	31.32
45	0.35	1.50	9.03	13.29	44.61
60	0.25	2.00	8.78	12.92	57.53
80	0.18	2.50	10.02	14.74	72.27
120	0.13	3.00	8.37	12.32	84.59
170	0.09	3.50	3.11	4.57	89.16
200	0.07	3.75	0.84	1.23	90.39
230	0.06	4.00	0.73	1.07	91.46
Pan			0.77	1.14	92.60
Total			62.93	92.60	92.60

Folk Statistics			
		phi	mm
5%	:	-0.68	1.60
16%	:	0.31	0.81
25%	:	0.74	0.60
50%	:	1.71	0.31
75%	:	2.61	0.16
84%	:	2.98	0.13
95%	:	4.10	0.06
Med.		1.71	0.31
Mean		1.67	0.32
St Dev.		1.39	
Skew		-0.02	
Kurt.		1.05	

Cu =	4.80	Gravel		1	%
		Coarse	Sand	2	%
		Med.	Sand	35	%
Cc =	1.05	Fine	Sand	52	%

Moment Statistics		
	Phi	mm
Mean	1.66	0.32
St. Dev.	1.24	0.42
Skewness	-0.69	
Kurtosis	3.25	

SEA, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV.	CLASSIFICATION	
COMP		Medium to fine sand (SP)	

PROJECT	Dade County Deepwater Study
AREA	Dade Co., Florida
BORING NO.	DCG-18R2
DATE	March, 2000

Hole No. DCG 99-19

DRILLING LOG | DIVISION | INSTALLATION | SHEET 1 OF 1

1. PROJECT: Dade County Deepwater Geotechnical Study	10. SIZE AND TYPE OF BIT: 4" Gravity Core
2. LOCATION (Coordinates or Station): X=960637.000 Y=535140.700	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLLW
3. DRILLING AGENCY: SEA, Inc./Alpine OSS	12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Gravity Core
4. HOLE NO. (As shown on drawing title and file number): DCG 99-19	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 1 undisturbed: 0
5. NAME OF DRILLER: Alpine OSS	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER
7. THICKNESS OF BURDEN 0 Ft.	16. DATE HOLE STARTED 12-14-99 COMPLETED 12-14-99
8. DEPTH DRILLED INTO ROCK 0 Ft.	17. ELEVATION TOP OF HOLE -286.7 Ft.
9. TOTAL DEPTH OF HOLE 3.8 Ft.	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF G. ZARILLO, SEA,INC

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-286.7	.0					-286.7
			Pale brown-white medium to fine carbonate sand. 10 YR 8/1-8/2 (SP)	100	2.0	
-280.5	3.8					-280.5

Composite 0-3.8 ft.

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1838 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: Dade County Deepwater Geotechnical Study | HOLE NUMBER: DCG 99-19

Sediment Analysis Data Sheet

Sample DCG-19-2.0

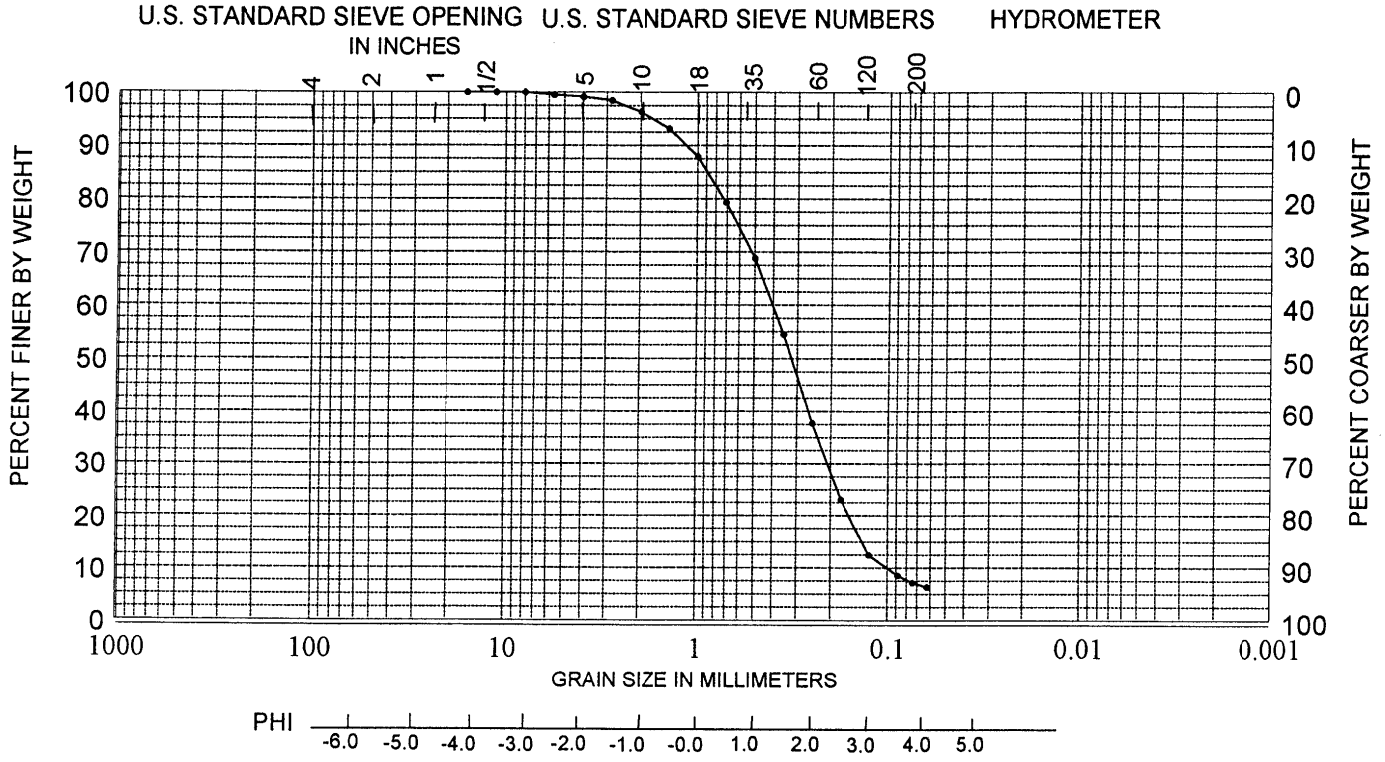
Sieve	Size (mm)	Phi size	Wt	Wt %	Cuml %
	16.00	-4.00	0.00	0.00	0.00
	11.31	-3.50	0.00	0.00	0.00
	8.00	-3.00	0.00	0.00	0.00
	5.66	-2.50	0.19	0.42	0.42
5	4.00	-2.00	0.16	0.37	0.79
7	2.83	-1.50	0.31	0.71	1.50
10	2.00	-1.00	0.90	2.05	3.55
14	1.41	-0.50	1.37	3.10	6.65
18	1.00	0.00	2.30	5.24	11.88
25	0.71	0.50	3.76	8.55	20.43
35	0.50	1.00	4.57	10.39	30.82
45	0.35	1.50	6.21	14.12	44.94
60	0.25	2.00	7.36	16.73	61.67
80	0.18	2.50	6.37	14.47	76.14
120	0.13	3.00	4.65	10.57	86.71
170	0.09	3.50	1.67	3.79	90.50
200	0.07	3.75	0.61	1.40	91.89
230	0.06	4.00	0.36	0.81	92.70
Pan			0.04	0.10	92.80
Total			40.84	92.80	92.80

Folk Statistics			
		phi	mm
5%	:	-0.77	1.70
16%	:	0.24	0.85
25%	:	0.72	0.61
50%	:	1.65	0.32
75%	:	2.46	0.18
84%	:	2.87	0.14
95%	:	4.08	0.06
Med.		1.65	0.32
Mean		1.59	0.33
St Dev.		1.39	
Skew		-0.03	
Kurt.		1.14	

Cu =	4.32	Gravel		1	%
		Coarse	Sand	3	%
		Med.	Sand	34	%
Cc =	1.14	Fine	Sand	54	%

Moment Statistics		
	Phi	mm
Mean	1.62	0.32
St. Dev.	1.24	0.42
Skewness	-0.76	
Kurtosis	3.39	

SEA, INC.



SAMPLE NO.	ELEV.	CLASSIFICATION	
2.0	-288.7	Medium to fine sand (SP)	PROJECT Dade County Deepwater Study
			AREA Dade Co., Florida
			BORING NO. DCG-19
			DATE March, 2000

Bakers Haulover

Hole No.CB-ND-49

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP	10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
2. LOCATION (Coordinates or Station): X=79065,7.7 Y=57195,8.1	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
4. HOLE NO. (As shown on drawing title and file number): CB-ND-49	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
5. NAME OF DRILLER: NICK PRICE	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: Tide = +2.3
7. THICKNESS OF BURDEN: 0 Ft.	16. DATE HOLE STARTED COMPLETED: 6/29/96 0945
8. DEPTH DRILLED INTO ROCK: 1.5 Ft.	17. ELEVATION TOP OF HOLE: -11.2 Ft.
9. TOTAL DEPTH OF HOLE: 3.5 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 100 %
	19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-11.2	0.0					-11.2
			Sand, fine to medium grained, gray, a little shell fragments (SP)			Lat-Lon 25 54 16.4N 80 06 56.9W
-13.2	2.0		Sandy limestone, a little shell fragments (LM)			Laboratory Data Depth USCS SpG. 1.0 SP
-14.7	3.5		End of Boring			
			Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT	HOLE NUMBER
DADE COUNTY SPP	CB-ND-49

Hole No.CB-ND-50

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP
2. LOCATION (Coordinates or Station): X=79119,8.6 Y=57189,9.5
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-ND-50
5. NAME OF DRILLER: NICK PRICE
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 0.3 Ft.
9. TOTAL DEPTH OF HOLE: 13.1 Ft.
10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 1
15. ELEVATION GROUND WATER: Tide = +2.8
16. DATE HOLE STARTED COMPLETED: 6/30/96 0915
17. ELEVATION TOP OF HOLE: -10.3 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 100 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-10.3	0.0					-10.3
			Sand, fine grained, brown (SP)			Lat-Lon 25 54 15.8N 80 06 51.0W Laboratory Data Depth USCS SpG. 2.0 SP 7.0 SP 10.5 SP 12.0 SP
-15.0	4.7					
			Sand, fine to medium grained, brown (SP)			
-17.7	7.4					
			Sand, fine to medium grained, gray, a little shell fragments (SP)			
-21.9	11.6					
			Sand, fine to medium grained, gray, mostly shell fragments (SP)			
-23.1	12.8					
-23.4	13.1	T	Limestone, gray, vuggy (LM)			
			End of Boring			
			Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: DADE COUNTY SPP

HOLE NUMBER: CB-ND-50

Hole No.CB-ND-51

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP
2. LOCATION (Coordinates or Station): X=79092,9.5 Y=57159,8.5
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-ND-51
5. NAME OF DRILLER: NICK PRICE
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 0.5 Ft.
9. TOTAL DEPTH OF HOLE: 12.5 Ft.
10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 2
15. ELEVATION GROUND WATER: Tide = +2.0
16. DATE HOLE STARTED COMPLETED: 6/30/96 0945/1123
17. ELEVATION TOP OF HOLE: -8.7 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 100 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-8.7	0.0					-8.7
			Sand, fine grained, brown (SP)			Lat-Lon 25 54 12.8N 80 06 54.0W Laboratory Data Depth USCS SpG. 1.5 SP 3.0 SP 7.9 SP
-13.6	4.9					
			Sand, fine grained, gray (SP)			
-15.4	6.7					
			Sand, fine grained, gray, a little shell fragments (SP)			
-20.7	12.0					
-21.2	12.5	I	Limestone, buff with fossils (LM)			
			End of Boring Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: DADE COUNTY SPP

HOLE NUMBER: CB-ND-51

Hole No.CB-ND-52

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP
2. LOCATION (Coordinates or Station): X=79058,6.3 Y=57109,2.1
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-ND-52
5. NAME OF DRILLER: NICK PRICE
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 2.2 Ft.
9. TOTAL DEPTH OF HOLE: 10.3 Ft.
10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 1
15. ELEVATION GROUND WATER: Tide = +0.7
16. DATE HOLE STARTED: 6/29/96 COMPLETED: 0600/1615
17. ELEVATION TOP OF HOLE: -11.8 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 79 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-11.8	0.0					-11.8
-13.9	2.1		Sand, fine to coarse grained, brown, mostly shell fragments (SP)			Lat-Lon 25 54 07.9N 80 06 58.9W Laboratory Data Depth USCS SpG. 1.0 SP 3.5 SP 6.0 SP 7.5 SP
-14.7	2.9		Sand, coarse grained, brown (SP)			
-16.3	4.5		Sand, fine to medium grained, brown, some shell fragments (SP)			
-18.3	6.5		Sand, fine grained, gray (SP)			
-19.9	8.1		Sand, medium to coarse grained, gray, mostly shell fragments (SP)			
-22.1	10.3		Limestone, dark gray (LM)			
			End of Boring Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: DADE COUNTY SPP

HOLE NUMBER: CB-ND-52

Hole No.CB-ND-53

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP	10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
2. LOCATION (Coordinates or Station): X=79131,7.4 Y=57111,8.3	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
4. HOLE NO. (As shown on drawing title and file number): CB-ND-53	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
5. NAME OF DRILLER: NICK PRICE	14. TOTAL NUMBER OF CORE BOXES: 2
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: Tide = +2.9
7. THICKNESS OF BURDEN: 0 Ft.	16. DATE HOLE STARTED: 7/2/96 COMPLETED: 1114/1123
8. DEPTH DRILLED INTO ROCK: 0.2 Ft.	17. ELEVATION TOP OF HOLE: -10.1 Ft.
9. TOTAL DEPTH OF HOLE: 15.2 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 100 %
	19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-10.1	0.0					-10.1
-11.3	1.2		Sand, medium to coarse grained, brown, mostly shell fragments (SP)			
-15.4	5.3		Sand, fine to medium grained, gray (SP)			Lat-Lon 25 54 08.1N 80 06 49.8W Laboratory Data Depth USCS SpG. 0.5 SP 3.0 SP 7.0 SP 11.8 SP-SM 13.5 SM
-17.6	7.5		Sand, fine to medium grained, brown (SP)			
-23.3	13.2		Sand, fine to medium grained, gray, lens of plastic silt @ 10.2', a little shell fragments (SP-SM)			
-25.1	15.0		Silty sand, fine grained, gray (SM)			
-25.3	15.2		Limestone, fine grained, tan (LM) End of Boring Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: DADE COUNTY SPP | HOLE NUMBER: CB-ND-53

Hole No.CB-ND-54

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP
2. LOCATION (Coordinates or Station): X=78032,4,8 Y=57220,3.3
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-ND-54
5. NAME OF DRILLER: NICK PRICE
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 2.8 Ft.
9. TOTAL DEPTH OF HOLE: 9.3 Ft.
10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 1
15. ELEVATION GROUND WATER: Tide = +0.3
16. DATE HOLE STARTED COMPLETED: 7/1/96 1438
17. ELEVATION TOP OF HOLE: -11.1 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 89 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-11.1	0.0					-11.1
-11.8	.7		Sand, fine grained, brown (SP)			
-12.1	1.0		Sand, fine to coarse grained, brown, mostly shell fragments (SP)			Lat-Lon 25 54 18.9N 80 07 0.6W Laboratory Data Depth USCS SpG. 1.0 SP 2.0 SP 5.5 SP-SM
-15.6	4.5		Sand, fine grained, brown (SP)			
-17.6	6.5		Sand, fine to medium grained, gray (SP-SM)			
-20.4	9.3		Limestone, buff, fossiliferous, some weathered shell sand (LM)			
			End of Boring			
			Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: DADE COUNTY SPP

HOLE NUMBER: CB-ND-54

Hole No.CB-ND-55

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP
2. LOCATION (Coordinates or Station): X=79093,2.7 Y=57217,9.8
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-ND-55
5. NAME OF DRILLER: NICK PRICE
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 4.0 Ft.
9. TOTAL DEPTH OF HOLE: 16.0 Ft.
10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 2
15. ELEVATION GROUND WATER: Tide = +3.0
16. DATE HOLE STARTED COMPLETED: 7/1/96 0930
17. ELEVATION TOP OF HOLE: -7.3 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 75 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-7.3	0.0					-7.3
-8.8	1.5		Sand, fine grained, brown (SP)			Lat-Lon 25 54 18.6N 80 06 53.9W
-9.8	2.5		Sand, fine grained, brown (SP)			Laboratory Data Depth USCS SpG. 1.0 SP 2.0 SP 5.0 SP 10.0 SP
-15.7	8.4		Sand, fine to medium grained, gray (SP)			
-19.3	12.0		Sand, fine to medium grained, gray, a little shell fragments (SP)			
-23.3	16.0		Oolitic limestone, buff, with fossils (LM)			
			End of Boring Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: DADE COUNTY SPP | HOLE NUMBER: CB-ND-55

Hole No.CB-ND-56

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP	10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
2. LOCATION (Coordinates or Station): X=79019,1.2 Y=57172,3.6	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
4. HOLE NO. (As shown on drawing title and file number): CB-ND-56	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
5. NAME OF DRILLER: NICK PRICE	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: Tide = +0.6
7. THICKNESS OF BURDEN: 0 Ft.	16. DATE HOLE STARTED: 7/1/96 COMPLETED: 1736/1739
8. DEPTH DRILLED INTO ROCK: 3.4 Ft.	17. ELEVATION TOP OF HOLE: -14.4 Ft.
9. TOTAL DEPTH OF HOLE: 7.4 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 68 %
	19. SIGNATURE OFGEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-14.4	0.0					-14.4
			Sand, fine to medium grained, brown, mostly shell fragments (SP)			Lat-Lon 25 54 14.1N 80 07 02.1W
-16.8	2.4		Sand, fine grained, brown, some shell fragments (SP)			Laboratory Data Depth USCS SpG. 1.0 SP 3.4 SP
-18.4	4.0		Sandy limestone, buff, vuggy (LM)			
-21.8	7.4		End of Boring Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT: DADE COUNTY SPP

HOLE NUMBER: CB-ND-56

Hole No.CB-ND-57

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP	10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
2. LOCATION (Coordinates or Station): X=79042,8.1 Y=57158,1.3	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
4. HOLE NO. (As shown on drawing title and file number): CB-ND-57	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
5. NAME OF DRILLER: NICK PRICE	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: Tide = +2.6
7. THICKNESS OF BURDEN: 0 Ft.	16. DATE HOLE STARTED COMPLETED: 7/2/96 1149
8. DEPTH DRILLED INTO ROCK: 1.2 Ft.	17. ELEVATION TOP OF HOLE: -11.4 Ft.
9. TOTAL DEPTH OF HOLE: 9.2 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 100 %
	19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-11.4	0.0					-11.4
			Sand, fine to medium grained, brown, mostly shell fragments (SP)			Lat-Lon 25 54 12.7N 80 06 59.5W
-13.8	2.4		Sand, fine to medium grained, gray, some shell fragments (SP)			Laboratory Data
-15.4	4.0		Sand, fine grained, light gray (SP-SM)			Depth USCS SpG. 1.5 SP 3.0 SP 4.5 SP-SM 6.0 SP
-16.4	5.0		Sand, fine to medium grained, gray, trace of shell fragments (SP)			
-19.4	8.0		Sandy limestone, with shell (LM)			
-20.6	9.2		End of Boring Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: DADE COUNTY SPP | HOLE NUMBER: CB-ND-57

Hole No.CB-ND-58

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP
2. LOCATION (Coordinates or Station): X=79135,0.0 Y=57159,0.0
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-ND-58
5. NAME OF DRILLER: NICK PRICE
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 3.2 Ft.
9. TOTAL DEPTH OF HOLE: 19.7 Ft.
10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 1
15. ELEVATION GROUND WATER: Tide = +2.6
16. DATE HOLE STARTED: 7/2/96 COMPLETED: 0910
17. ELEVATION TOP OF HOLE: -8.8 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 95 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-8.8	0.0					-8.8
-9.9	1.1		Sand, fine to medium grained, brown (SP)			
-10.6	1.8		Sand, fine grained, brown (SP)			Lat-Lon 25 54 12.7N 80 06 49.4W Laboratory Data Depth USCS SpG. 0.5 SP 3.0 SP-SM 11.0 SP-SM 15.0 SP-SM
-25.3	16.5		Sand, fine to medium grained, gray, mostly shell fragments (SP-SM)			
-28.5	19.7		Limestone, buff, sandy, some shell (LM)			
			End of Boring Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: DADE COUNTY SPP | HOLE NUMBER: CB-ND-58

Hole No.CB-ND-59

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP
2. LOCATION (Coordinates or Station): X=79187,4.6 Y=57127,5.5
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-ND-59
5. NAME OF DRILLER: NICK PRICE
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.
9. TOTAL DEPTH OF HOLE: 16.4 Ft.
10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 1
15. ELEVATION GROUND WATER: Tide = +0.3
16. DATE HOLE STARTED COMPLETED: 6/30/96 1350
17. ELEVATION TOP OF HOLE: -12.2 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 100 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-12.2	0.0					-12.2
			Sand, fine grained, light brown (SP)			Lat-Lon 25 54 12.7N 80 06 49.4W
-15.2	3.0		Sand, fine grained, gray (SP)			Laboratory Data Depth USCS SpG. 1.5 SP 5.9 SP 7.0 SP 9.0 SP-SM 12.0 SP-SM
-19.1	6.9					
-20.3	8.1		Sand, fine to medium grained, gray, pieces of limestone, a little shell fragments (SP)			
-20.7	8.5		Peat (PT)			
			Sand, buff, coarse grained, mostly weathered shell fragments (SP-SM)			
-28.6	16.4		End of Boring			
			Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT: DADE COUNTY SPP | HOLE NUMBER: CB-ND-59

Hole No.CB-ND-60

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP
2. LOCATION (Coordinates or Station): X=79015.8.6 Y=57125.7.9
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-ND-60
5. NAME OF DRILLER: NICK PRICE
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 0.7 Ft.
9. TOTAL DEPTH OF HOLE: 6.7 Ft.
10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 1
15. ELEVATION GROUND WATER: Tide = +0.5
16. DATE HOLE STARTED COMPLETED: 7/1/96 1656
17. ELEVATION TOP OF HOLE: -12.8 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 69 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-12.8	0.0					-12.8
-13.8	1.0		Sand, fine to coarse grained, brown, mostly shell fragments (SP)			
-16.8	4.0		Sand, fine to medium grained, brown, mostly shell fragments (SP)			Lat-Lon 25 54 9.5N 80 07 02.4W Laboratory Data Depth USCS SpG. 0.5 SP 2.0 SP 4.3 SP
-18.8	6.0		Sand, fine grained, gray (SP)			
-19.5	6.7		Limestone, buff, massive, crystaline & fossiliferous (LM)			
			End of Boring			

Soils are field visually classified in accordance with the Unified Soils Classification System.

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: DADE COUNTY SPP | HOLE NUMBER: CB-ND-60

Hole No.CB-ND-61

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP	10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
2. LOCATION (Coordinates or Station): X=79095,2.7 Y=57122,4.8	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
4. HOLE NO. (As shown on drawing title and file number): CB-ND-61	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
5. NAME OF DRILLER: NICK PRICE	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: Tide = +2.9
7. THICKNESS OF BURDEN: 0 Ft.	16. DATE HOLE STARTED: 7/2/96 COMPLETED: 0955
8. DEPTH DRILLED INTO ROCK: 0.4 Ft.	17. ELEVATION TOP OF HOLE: -10.3 Ft.
9. TOTAL DEPTH OF HOLE: 12.0 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 100 %
	19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-10.3	0.0					-10.3
			Sand, fine to medium grained, brown, mostly shell fragments (SP)			Lat-Lon 25 54 9.1N 80 06 53.4W Laboratory Data Depth USCS SpG. 2.5 SP 8.5 SP 9.3 SP-SM 11.0 SP-SM
-18.3	8.0					
			Sand, fine grained, brown, trace of shell fragments (SP)			
-19.3	9.0					
			Sand, fine to medium grained, gray, trace of shell (SP-SM)			
-21.9	11.6					
-22.3	12.0		Limestone, fine grained, tan (LM)			
			End of Boring			
			Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: DADE COUNTY SPP | HOLE NUMBER: CB-ND-61

Hole No.CB-ND-62

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP
2. LOCATION (Coordinates or Station): X=79014,5.4 Y=57078,9.2
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-ND-62
5. NAME OF DRILLER: NICK PRICE
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 3.5 Ft.
9. TOTAL DEPTH OF HOLE: 9.3 Ft.
10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 2
15. ELEVATION GROUND WATER: Tide = +2.2
16. DATE HOLE STARTED COMPLETED: 7/2/96 1248
17. ELEVATION TOP OF HOLE: -11.3 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 72 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-11.3	0.0					-11.3
-12.5	1.2		Sand, fine to medium grained, brown, mostly shell fragments (SP)			Lat-Lon 25 54 4.9N 80 07 2.6W
-13.8	2.5		Sand, fine to medium grained, gray, some shell fragments (SP)			Laboratory Data Depth USCS SpG. 1.0 SP 2.0 SP 4.0 SP
-17.1	5.8		Sand, fine grained, gray (SP)			
-20.6	9.3		Limestone, buff, some shell (LM)			
			End of Boring Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT: DADE COUNTY SPP | HOLE NUMBER: CB-ND-62

Hole No.CB-ND-63

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 1

1. PROJECT: DADE COUNTY SPP
2. LOCATION (Coordinates or Station): X=79054,3.0 Y=57073,6.2
3. DRILLING AGENCY: ALPINE OCEAN SURVEY, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-ND-63
5. NAME OF DRILLER: NICK PRICE
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 0 Ft.
8. DEPTH DRILLED INTO ROCK: 3.7 Ft.
9. TOTAL DEPTH OF HOLE: 10.1 Ft.
10. SIZE AND TYPE OF BIT: 3 1/2" Drive Shoe
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: VIBRACORE
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 0 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 2
15. ELEVATION GROUND WATER: Tide = +1.3
16. DATE HOLE STARTED COMPLETED: 7/2/96 1404
17. ELEVATION TOP OF HOLE: -11.4 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 75 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND BURR

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS
-11.4	0.0					-11.4
-13.8	2.4		Sand, fine to coarse grained, brown, mostly shell fragments (SP)			Lat-Lon 25 54 04.38N 80 06 58.28W
-17.8	6.4		Sand, fine to medium grained, gray (SP)			Laboratory Data Depth USCS SpG. 2.0 SP 3.5 SP 5.0 SP-SM
-21.5	10.1		Limestone, buff, mostly a cemented shell hash, layer of uncemented shell sand at 7.0' (LM)			
			End of Boring Soils are field visually classified in accordance with the Unified Soils Classification System.			

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: DADE COUNTY SPP

HOLE NUMBER: CB-ND-63